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EDITOR

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The Canadian Medical Association Journal

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Foreword 1927

WITH the first issue of our *Journal* in the New Year the Editorial Board, while presenting New Year's greetings to the members of the Association, desires also to express appreciative thanks to all those who by their original papers, case reports, society reports, reviews of important advances in knowledge, editorials, and provincial monthly budgets of current events have in such large measure contributed to the success of the *Journal* during the past year.

Our readers will have noted that in every department of the *Journal* advance has been made; an advance to which this year we are glad to say, every province has contributed. Appreciative of this generous assistance in the past the Editorial Board looks forward with confidence to the New Year, and promises that no effort on its part will be spared to make the *Journal* worthy of the support of the profession throughout Canada.

We have received during the past month promises of co-operative assistance from every university in the Dominion, and from medical societies in every province, and we are permitted to announce the publication of the following:—

From the University of Toronto, a series of papers by members of the staff on surgical and medical subjects.

From the University of Manitoba, several articles on Heart Disease by Prof. William Boyd; a continuation of the interesting editorials and reviews on biological subjects by Prof. A. T. Cameron; also surgical essays by Prof. T. Glen Hamilton.

From the University of Dalhousie, occasional papers by members of the medical and surgical staffs, and a series of articles by Prof. A. G. Nicholls of the department of pathology.

Prof. James Miller of Queen's University is preparing a series of papers on the cancer problem, the first of which appears in our present number. He also writes us that he will send, from time to time, a report

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of the more interesting cases which come up for discussion at the clinico-pathological conferences held in the medical school of that university.

In the present issue we are presenting to our readers the third paper on Hereditary Abnormalities of the Eye by Dr. Madge Thurlow Macklin. We have the promise of six further papers in which the following hereditary faults will be discussed: Defects of the eyeball; of the cornea and sclera; of the iris and lens; of the retina; of the muscular apparatus and of defects involving refractive problems.

Promises of assistance have also been received from the staffs of McGill University, of Laval University, of the University of Montreal, of the University of Western Ontario, and the Universities of Saskatchewan and Alberta.

We also hope to present to our readers many of the papers read before the Academy of Medicine in Toronto, with, when practicable, an abstract of the discussion following their presentation.

The history of the medical profession in Canada is a story well worth recording; several papers on the history of our medical schools have already appeared in the *Journal*, and we have the promise of three important articles for this department, one of them by Dr. H. B. Anderson, which we hope to publish shortly.

The Editorial Board in the past, and more strongly than ever in the coming year, desires that the *Journal* should represent the professional spirit of service, rather than that it should be regarded as in any way a financial venture. It is the desire of the Board that the *Journal* should be carried on in the spirit which should inspire all medical work; the desire to do things because they are worth while in themselves. To contribute to a medical journal is a terror to some, a labour to most, a pleasure to few, and of direct personal gain to none. The work of editing the *Journal* is difficult because it can offer little financial return to its contributors, and must ask the majority of them to assist as a duty to their profession, to their university and to their country. Medical writing, however, in addition to its being a service is a powerful aid in self-education; self-education in that rarely thought of sense in which the object is attained by one's own mental efforts. Medical writing demands clear thinking and exact expression, and the use of words which will convey the precise meaning desired. It is seldom that clear expression can be secured without effort. On this subject we desire to commend the methods employed and recommended by Sir William Osler and Sir Clifford Allbutt, which appear on another page in this issue.

An Address

ON

PUERPERAL INFECTION*

By Sir Ewen Maclean, M.D., F.R.C.P., (Lond.), F.R.S., (Edin.)

Cardiff, Wales

PUERPERAL mortality is an international subject, and one which should engage the urgent interest of the League of Nations in even greater degree than it appears yet to have done. Puerperal sepsis is by far its greatest single factor. In the 1922 figures for England and Wales, no less than 1,029 out of 2,971 maternal deaths were due to puerperal sepsis. The next largest figure in the same total was 556 deaths attributed to toxæmia, and then 390 to hæmorrhage. It is to be noted, too, that fifty-four deaths from phlegmasia are not included in the enormous sepsis figure.

The available and comparable mortality tables of all nations show the same dominance of the sepsis factor. The following tables are suggestive, though the ratio of the mortality due to sepsis is not shown in the international figures.

The outstanding fact is that, for some reason or group of reasons not yet fully demonstrated, obstetrics throughout the known world has not shared in like degree with other departments of medicine in the benefits conferred on mankind by the researches of Pasteur and Lister.

Progress, it is true, has been made, particularly in institutional midwifery, and the figures tend to show improvement where ante-natal practice and clinics are gaining ground, but the sepsis factor in puerperal mortality still remains a veritable *opprobrium medicorum*.

The real concern of the profession is aroused, and that is all to the good, but more significant still is the portent that the public is asking, and asking pertinently, if this calamitous disease is preventable, why is it not prevented?

It took many long years of propaganda work in Great Britain to arouse public interest by constant reiteration of the fact that in England and Wales 40,000 mothers were lost every ten years from diseases and accidents of childbirth, and that half of that appalling total was attributable to puerperal fever—a preventable disease. The Midwives' Act, 1902, resulted, and has undoubtedly done much to modify the problem. True it is that in some areas, more

* Read before the Academy of Medicine, Toronto, on Tuesday, November 2, 1926.

Distribution for Wales and for England and Wales of Mortality of Women in Childbirth, per Thousand Children Born Alive, Distinguishing Septic and other Causes, 1921, 1922, and 1923

	1921		1922		1923	
	Wales	*England and Wales*	*Wales*	*England and Wales*	*Wales*	*England and Wales*
County boroughs—						
Sepsis	1.35	1.54	3.32	1.62	1.94	1.41
Other causes	2.99	2.40	3.34	2.28	2.67	2.60
All causes	4.34	3.94	6.56	3.90	4.61	4.01
Other urban districts—						
Sepsis	1.72	1.27	1.31	1.27	1.49	1.25
Other causes	3.47	2.76	3.77	2.68	3.92	2.57
All causes	5.19	4.03	5.08	3.95	5.41	3.92
Rural districts—						
Sepsis	1.80	1.25	1.45	1.16	1.51	1.15
Other causes	4.55	2.97	3.83	2.85	4.54	2.72
All causes	6.35	4.22	5.28	4.01	6.05	3.87
All districts—						
Sepsis	1.67	1.38	1.75	1.38	1.59	1.30
Other causes	3.68	2.53	3.68	2.43	3.83	2.51
All causes	5.35	3.91	5.43	3.81	5.42	3.81

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MATERNAL MORTALITY RATES
ALL CAUSES PER THOUSAND BIRTHS

	North Ireland	*Irish Free State*	*South Africa*	*Australia*	*New Zealand*	*Canada**
1915	..	..	3.97	4.27	4.70	..
1916	..	..	3.49	5.27	5.86	..
1917	..	..	4.34	5.63	5.98	..
1918	..	..	4.13	4.71	5.18	..
1919	..	..	3.88	4.66	5.06	..
1920	..	..	4.10	5.01	6.48	..
1921	..	..	4.12	4.72	5.08	5.1
1922	5.86	6.29	..	4.52	5.14	5.5
1923	6.05	5.32	..	5.11	5.11	..

* No vital statistics were published for Canada for the years previous to 1921.

especially rural areas, the tradition dies hard that childbed fever is common and is usually unavoidable, but, speaking generally, there is evidence of genuine concern, and the obligation rests on us to respond to this communal renaissance of interest, and to use it as a vehicle to carry into effect measures which depend so largely for their success on intelligent co-operation between the public and the profession, for example, notification. An effective system of notification is essential to success in the attack upon puerperal sepsis.

In England and Wales, from the state administration point of view, a difficult choice lay as to whether notification should continue to apply only to cases in which a diagnosis of puerperal infection might be presumed to have been established, or whether it should apply to all cases of sustained puerperal pyrexia. If the former, there is the proved risk of prejudicing early treatment, and the prevention of the spread of infection. If the latter, then many conditions associated with pyrexia and not due to puerperal sepsis must necessarily be included in the widely cast net.

The British Ministry of Health has taken its courage in both hands, and under the Public Health (Notification of Puerperal Fever and Puerperal Pyrexia) Regulations 1926, has re-enacted the former and added the latter. The regulations came into force on the first day of October, and medical practitioners have been notified accordingly that while puerperal fever remains notifiable in terms of the Infectious Diseases (Notification) Acts, these regulations place the further obligation upon practitioners of notifying, at the usual fee (2/6), all cases of pyrexia occurring during the puerperium irrespective of their cause; puerperal pyrexia, for the purpose of the regulations, being defined as "any febrile condition" (other than obvious puerperal fever) "occurring in a woman within twenty-one days after childbirth or miscarriage in which a temperature of 100.4° F. or more has been sustained during a period of twenty-four hours or has recurred during that period."

The definition covers a wide range of conditions, many of which are not communicable diseases. It becomes necessary, therefore, to notify on a *separate form* the authorities regarding every patient suffering from definite puerperal fever, although the case may already have been notified as puerperal pyrexia before a final diagnosis had been reached.

New forms for notification have been issued, and provide for the requisitioning of nursing service, bacteriological investigation, specialist advice and assistance in doubtful cases of puerperal pyrexia or puerperal fever at the request of the medical practitioner, if the patient is unable to bear the cost herself.

In many towns and some rural centres institutional accommodation has been or is being provided.

This is a move forward, and the outcome of this ampler scope of notification and greater facilities for diagnosis, treatment and accommodation, will afford, after a reasonable period of time, material for very valuable analysis. We shall then be, let us hope, in a position to more nearly estimate the size of the problem.

It is admitted that the present available notification figures afford a very imperfect index of the prevalence of the morbidity or mortality associated with puerperal sepsis. In some areas, for instance, the actual number of deaths due to this cause have exceeded the number of notifications.

It will be useful, then, to know more accurately the real prevalence of the malady, but we may be assured already that its incidence is sufficient to compel every effort being made

on the line of clinical research, and of bacteriological and biochemical investigation.

There is not, on this occasion, sufficient time to do more than offer some few remarks under these headings.

As regards *clinical research,* I believe that many current notions as to the presence, degree, kind and method of infection would be considerably modified by more careful observation. Take, for instance, the claim advanced not infrequently in a general discussion and by busy practitioners of experience, that they never or, at all events, very rarely, find any ill-effects following the use of forceps, and that every primipara is entitled, even in normal cases, to the relief afforded by their employment.

There can, I think, be but little doubt that closer observation in groups of these cases would reveal an unsuspected morbidity in the puerperium, and end results far from ideal.

The same remark would apply also to many, probably most, of those wonderful cases in which uninterrupted afebrile recoveries are claimed after, for example, the performance of a tedious embryotomy on an exhausted patient in the worst possible environment. I am not denying the possibility of such recoveries, but they are not the common experience even in institutional practice, where cases may be admitted presenting no alternative to embryotomy, but with every facility and help available.

Then again, that group represented to the extent of 22 per cent in a series of 247 fatal cases presented in the London report at the last Congress of British Obstetricians and Gynæcologists. The cases in this group are stated to have undergone spontaneous and normal labour, the implication being that the fatal infection was endogenous.

This class of case is also represented to the extent of 25 per cent in a series of 256 cases in Dr. Janet Campbell's report for the Ministry of Health on maternal morbidity and mortality (1924). Here again labour had been spontaneous and normal with no traceable interference by doctor, midwife or other attendant. I, personally, have no difficulty in accepting the possibility and fact of endogenous infection in certain cases, but I believe that many other cases included in this category, on the basis of closer examination, would with more justification be transferred to the exogenous class.

Bourne points out in his review of recent advances in obstetrics that summing up the possibility and importance of autogenous infection there is indisputable evidence of puerperal fever of the worst forms developing after perfectly normal labour without interference or damage, and, occasionally, without even vaginal examination. There is, further, the bacteriological evidence that many women have a vaginal streptococcus before labour, and that in a few cases the organism is of the hæmolytic type. But there is not that sequence of pyrexia following the labours of those who have such vaginal infections, which might be expected if the organism itself were the chief or the only important element. In many there is no raised temperature, even when streptococci are present, and this fact tends to focus attention on the other great factor in the problem, the "soil" on which the microbe is planted. More knowledge is needed on the question of resistance during the early puerperium, and the local immunity developed against the autogenous organism.

Bourne argues that if it can be proved that delivery is followed by a negative phase of resistance, then it is theoretically possible that not only vaginal organisms but others infecting chronic foci of the body, such as teeth, fæces, urine, throat, etc., may, in the presence of a diminished resistance after labour, suddenly develop increased virulence and spread rapidly into the blood stream. In these cases they would be automatically poured out into the uterine cavity and so give the impression of a uterine infection by the ordinary bacteriological examination of the uterus.

It is suggested that strong clinical evidence exists to support the theory of the generalization of infection from localized non-genital foci immediately after labour, but not until the bacteriology of the blood before and after labour is fully worked out can there be much exact knowledge for summing up the place of autogenous infection in the production of puerperal sepsis.

In the University of Wales we have recently founded a research scholarship with the broad and ambitious objective of enquiring into the factors which constitute and the conditions which vary resistance to disease, especially as regards midwifery.

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One often hears the statement that puerperal sepsis is a bacteriological problem. This is no doubt true, but it is not the whole of the truth. The multiple and complex factors, many of which are so elusive and difficult to compute, which enter into the make-up of health and resistance to infection, are as attractive to our researchers as are the unscaled heights to the mountaineer.

The experienced clinical observer, the bacteriologist and the biochemist, may be difficult to find combined in one person, but in properly allocated and focussed team work, unhurried but unrelenting, the gleam of new truths will be caused to appear.

May I say how much and how widely appreciated is the first class work emanating from the Department of Pathological Chemistry of your university in connection with the Maternity Metabolism Ward of your General Hospital. That class of work is blazing the trail through to fertile country.

May I also say, in passing, that a maternity department as part of a general hospital which is in intimate relationship with the university is ideally placed, not only from the point of view of research, but also, and still more importantly, from that of the immediate interests of the patients. Every country needs more institutional maternity beds, and the addition to their number in any relationship is good, but as an integral part of a general hospital in which the services of one or more of the various departments are available as occasion may require, the institutional maternity bed is much better. Where the services of the university with its highly developed research facilities are superadded, the arrangement is best of all. In the clinical, bacteriological and biochemical aspects of our ante-natal schools, our hope for the future betterment of obstetrics may be confidently placed.

As the stars in heaven for multitude are the various *methods of treatment*, a sure sign of unsettled knowledge as to causation and unsatisfactory therapeutics.

In the London Committee report previously referred to, no less than fifty different methods or combinations of methods were mentioned, which defy anything like useful analysis.

They included the employment of different sera, vaccines, blood transfusion, immuni-transfusion, collosol-iodine, quinine, mercurosol, irrigation of the uterine cavity. In the subsequent debate reference was made to the intra-uterine injection of glycerine and to the more radical and hazardous procedures of hysterectomy and ligation of the pelvic veins.

This is an admittedly unsatisfactory state of affairs and one which calls upon us individually and collectively, in those spheres in which we work or which we can influence, to advance knowledge as to the factors concerned in this distressing malady, for upon such further knowledge alone can effective treatment be based.

Epidemic Meningitis.—Most of the laity and many physicians think that patients recovering from epidemic meningitis are liable to be seriously handicapped, especially in their mental development. For this reason, Josephine B. Neal, Henry W. Jackson and Emanuel Appelbaum, New York, have followed up as many of their patients who recovered as possible to learn what percentage of cases show after-effects, and the nature of them. The mortality for 627 cases was 29.8 per cent. The mortality was highest among patients under one year of age (46.5 per cent); among patients over thirty, it was 30.8 per cent; from one to two years, it was 29.2 per cent. The great majority of patients, 82 per cent, make a complete recovery. About 18 per cent show sequelæ, and these are often of a serious nature. The most important and frequent of the sequelæ is deafness (7.7 per cent). Defects of vision are of rarer occurrence (2.1 per cent); paralysis occurred in 3.2 per cent; mental disturbances in 2.3 per cent. Rarer but nevertheless important sequelæ were also encountered. In two instances there were sphincteric disturbances—one rectal and one vesical. One patient developed a pachymeningitis nearly two years later. Another patient developed a complete transverse myelitis.—*J.A.M.A.*, Nov. 20, 1926.

An Address

ON

THE TOXÆMIAS OF PREGNANCY*

By W. B. Hendry, D.S.O., B.A., M.B.

Professor of Obstetrics and Gynæcology, University of Toronto

BROADLY speaking the toxæmias may be described as disturbances of maternal metabolism due to pregnancy. In recent years biochemists throughout the world have been carrying out investigations of the blood and urine of pregnant women in an endeavour to determine the definite cause and the exact nature of these disturbances, but up to the present time they have been unsuccessful. They have, however, accumulated a great deal of information, and have brought to light many facts concerning the chemistry of the blood which are of value to the clinician.

For example, they have shown that in the healthy non-pregnant woman there is a definite relation existing between the daily intake and output of liquids, and a constant proportion of solids to liquids in her blood. This proportion is often described as the water balance. They have also shown that in pregnancy this water balance is definitely disturbed, in that there is a gradually increasing dilution of the blood from the first to the seventh or eighth lunar month of gestation, and from then on a decreasing dilution until term, while after labour the water balance is restored to normal. They have further shown that as the fluid content of the blood increases, there is a corresponding increase in the chloride content of the body until the eighth month and then a diminution until term. In other words, in pregnancy there is a definite hydræmia which steadily increases until the eighth month, and then decreases towards term, and the salt content keeps pace with the hydræmia.

Pregnancy materially increases the general work of metabolism on the part of the mother in three ways: firstly, in the transfer of material necessary for the growth of the fœtus, uterus, placenta and membranes; secondly, in taking care of the waste of the child, which in the later months carries on a definite metabolism of its own; and lastly in the elimination of this extra waste. This additional work may be undertaken and carried out by the perfectly healthy woman without any outward symptoms of disease, but many are unequal to the task. The presence of the fœtus introduces some as yet unknown factors, which cause a further disturbance of the water balance, and bring about the conditions which we describe as the toxæmias.

Whether these unknown factors are to be found in the endocrine glands, such as the pituitary, thyroid, and pancreas, or in the liver or kidneys, or whether one or more of these organs have been on the borderline between health and disease, and the extra strain of pregnancy has unfavourably tipped the scale, it is difficult to say. The result is the same—impaired function.

The effects on the mother are manifested in different ways, and at different times during the pregnancy, and appear confined chiefly to the first and the last trimester of the pregnant state, that is, at first, while the placenta is being formed, and again, after the fœtus has acquired a definite metabolism of its own. In these periods two entirely dissimilar pictures are presented, which we distinguish as the early and the late toxæmias. In each there is a disturbance of the water balance, but in the early toxæmias there is a marked tendency towards dehydration, while in the late toxæmias there is a marked tendency towards hydræmia.

The early toxæmias are characterized by nausea and vomiting of varying degrees of severity, from a slight distaste for food and the smell of cooking to uncontrollable vomiting, marked dehydration and prostration. The de-

* Read at the annual meeting of the Canadian Medical Association, Victoria, June, 1926.

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hydration is proportional to the severity of the condition. The volume of the urine passed in the severe cases is usually low, with a correspondingly high specific gravity. It is dark reddish in colour and may contain bile. Albumen is almost always present and the urine almost invariably contains acetone bodies. These acetone bodies are evidences of disturbed liver function resulting in starvation, while the dehydration is the result of three things: first, the normal body loss of water; second, the loss of fluids through vomiting, and third, the inability of the patient to replace them through the ordinary channels.

While investigating a series of seventy cases of early toxæmia in 1918, Duncan and Harding were led to advance the theory that the nausea and vomiting of early pregnancy were due to a deficiency of glycogen in the maternal liver, basing their conclusions on two facts: first, that all of these cases showed in the urine evidence of acetone bodies, which are to be regarded as symptomatic of a disturbed state of the maternal liver, and second, that all of them improved, and most of them rapidly recovered, on a diet or treatment high in carbohydrates.

Another factor concerned was intestinal intoxication. Even in the non-pregnant state a loaded bowel may produce among other symptoms a distaste for food and also vomiting. With pregnancy supervening such a condition would be exaggerated to a greater or less degree.

Neurosis was also considered an important factor. Normal pregnancy heightens the nervous reflexes, and an unduly sensitive nervous system diminishes the store of glycogen in the liver.

These observers, therefore, considered that the primary etiological factor in the nausea and vomiting of pregnancy is a lack of sugar in the liver, with intestinal intoxication and neurosis as secondary factors, the metabolic and neurotic factors reinforcing one another. Fatty infiltration of the liver ensues, and consequent on the nausea comes a distaste for food resulting in starvation, which leads to further fatty infiltration and destruction of liver cells.

Most commonly the nausea and vomiting are confined to the first third of pregnancy. This is the time during which the placenta is formed, one of the functions of which in its early stages is to store glycogen for the growing fœtus. In this way it functions for the fœtal liver until that organ is able to store its own reserve carbohydrates, and during this period of storage it is the glycogen of the maternal liver on which the fœtus draws for its supply. With the placental formation complete, a condition of equilibrium is established between placenta and maternal liver. The drain on the latter is lessened, its store of glycogen replaced, the liver cells regenerate and the nausea and vomiting disappear. In some cases the balance between placental and hepatic glycogen is never reached and the vomiting persists throughout the pregnancy.

This is in outline the theory on which the condition of *hyperemesis gravidarum* was at first explained. Later on, the observations of Harding and Van Wyck led to the conclusion that dehydration plays a most important part in the vomiting of pregnancy. The question as to whether or not this theory regarding the carbohydrate upset in the liver is correct is of minor importance in view of the known existence of dehydration. There is certainly a great loss of body fluid in both moderate and severe cases of vomiting, and in order to restore the normal water balance treatment should be directed towards replacing the lost fluids through all the available routes, *viz.*, the mouth, rectum, subcutaneous tissues, and veins.

With this end in view we have adopted the following routine for all vomiting cases admitted to the Burnside Lying-in Department of the Toronto General Hospital:

1. On admission the patient is isolated from the rest of the patients, put to bed and allowed no visitors.

2. A complete physical examination is made and appropriate treatment instituted for any abnormal pelvic conditions.

3. An intravenous injection of 1000 c.c. of 5 per cent glucose solution in normal saline is given daily until a diuresis is obtained, that is, until the daily volume of urine excreted reaches 1000 c.c. (40 ozs.) with a specific gravity of 1010 or under, and the acetone bodies disappear.

4. Rectal enemas of 200 c.c. (8 ozs.) of 10 per cent solution of glucose in normal saline are given four times daily, 30 to 40 grains of sodium bromide being added to the nightly enema for the first day or two.

5. No solids are given by the mouth, but the

patient is encouraged to drink as much fluid as she can, even if she is vomiting freely.

6. The bowels are emptied daily by a simple enema in the morning.

7. The daily intake and output of fluids are carefully measured and a daily record kept of the specific gravity of the urine together with the amount of albumen and acetone bodies present.

Under the treatment outlined above there is usually a favourable response within two or three days. The vomiting lessens and the patient begins to feel hungry. When this occurs she is given small quantities of food, such as toast, jam, marmalade, baked apple, stewed fruit, and baked potato. At this stage the intravenous glucose is discontinued, but fluids are still forced by mouth and rectum. If the solids are well borne the variety is increased by the addition of chicken or fish and some vegetables. Vegetable broths are usually well borne. As the diet is increased the enemas are discontinued and a laxative given as necessary. With a return to a fairly full diet the patient is advised against the use of fatty foods, pastries, etc., and is encouraged to drink at least a quart and a half of fluid daily.

Intensive treatment is not continued for more than a week or ten days. If in that time the daily output of urine has not increased to 40 ozs., and the specific gravity fallen to 1010 or lower, then the dehydration has not been overcome. The danger signs are a rising pulse rate and falling blood pressure, a dry tongue, and blurring vision. When these occur following a week's treatment, it is time to consider terminating the pregnancy.

From July 1922 to July 1926 we have treated forty cases of pernicious vomiting in our metabolism ward according to the routine outlined above. In thirty-four of these the treatment was successful, while in six it failed. All six failures were cases in which vomiting had persisted for four weeks or more before admission to hospital and on these therapeutic abortion was performed. These figures are in accord with our contention that success depends upon instituting the treatment early, at a time before the dehydration has advanced beyond control.

Complete confidence and co-operation between patient and attendants are necessary for success. Long continued vomiting before treatment is begun, lack of co-operation, distrust, fear and distaste for motherhood usually play an important part in the failures.

The late toxæmias are usually ushered in with the unholy trinity of symptoms—albuminuria, high blood pressure, œdema—the classical picture of hydræmia. These toxæmias have been made the subject of much experimental work in recent years in the hope that the chemical findings might form a basis for diagnosis and prognosis, but so great a disparity has been found at times to exist between the blood picture and the clinical picture in the same case, and so little uniformity in the chemical picture presented in a series of similar clinical cases, that the experienced clinician is inclined to rely more on his own observations than on the laboratory report of the chemical condition of the blood.

The biochemist has, however, greatly increased our knowledge of the metabolic process of abnormal pregnancy and also has brought to light certain facts which have materially changed our treatment of pre-eclampsia in the Toronto General Hospital. For example, it has been proved that the powers of excretion of nitrogenous products are not seriously impaired in true toxæmia. This has led to the conclusion that if the kidneys are capable of taking care of the waste products in such cases it is not necessary to place toxæmic patients on a starvation diet, and that a more liberal diet will not only do no harm but will do good to both mother and fœtus.

Furthermore, it has been proved that in true toxæmia, hydræmia is always associated with a retention of salt in the body. As stated earlier there is an increasing hydræmia in normal pregnancy up until the seventh or eighth month, and then a gradual return to normal at term. In pre-eclampsia there is a further increase in the hydræmia in the later months and a corresponding increase in the chloride content of the body. This disturbs the water balance, and the œdema increases while the volume of urine decreases. When more salt is added to the diet the œdema increases further, and the urine diminishes proportionately. When salt is removed from the diet the reverse is the case. This inter-relationship between salt and fluid output has been explained as probably due to the inability of the kidneys to excrete the

chlorides, which are consequently retained in the body, and thus prevent the normal excretion of water, and possibly due to distension of the intertubular capillaries of the kidney mechanically obstructing the lumen of the collecting tubules.

No matter what the mode of its action actually is, the salt appears to be the offender, and therefore treatment should be directed towards lowering its amount in the body.

Having arrived at these two conclusions, first that the kidneys were able to take care of the nitrogenous products in pre-eclampsia, and that an excessive amount of salt was responsible for the œdema, Harding and Van Wyck made a series of observations on patients fed on protein, carbohydrate, fat, mixed and starvation diets in turn, but entirely salt free, and proved to their own and our satisfaction that the patients almost invariably improved steadily on ordinary salt free diet. In a few days the water balance was restored, the œdema gradually disappeared, the blood pressure fell and the quantity of albumen lessened, while the accompanying headache and eye symptoms disappeared. At the same time the volume of urine increased and its specific gravity fell. With the addition of salt to the diet there was a return of the œdema, high blood pressure and the accompanying symptoms. With its removal from the diet the signs and symptoms again disappeared. In other words œdema could be increased or lessened at will by the addition or subtraction of salt from the diet. This led to the adoption of the following routine treatment of pre-eclampsia at the Burnside Hospital:

1. On admission the patient is isolated and put to bed.

2. She is given a mixed diet entirely salt free until the excretion of chlorides has reached its low level and the œdema has disappeared, when a small quantity of salt, 3 grammes, is added to the diet.

3. The bowels are opened daily with a mild laxative. There is no great purging of the patient.

4. Each day a record of the blood pressure, fluid intake and output is kept, and the urine is examined for albumen, while its specific gravity is noted.

During the last five years there have been one hundred and twelve cases of pre-eclampsia admitted to the hospital and while all were on salt free diet, eighty-one were on starvation diet and thirty-one on the more liberal diet as suggested above. In no case did eclampsia develop. All showed signs of improvement and were tided over until term or until labour could be induced.

These results, we think, justify our adoption of the salt free diet in pre-eclampsia. We feel that it has several advantages over other lines of treatment owing to the fact that with it the œdema disappears uniformly, the patients are not starved, and general improvement is usual. Besides which, the treatment is logical and in harmony with the experimental facts.

Furthermore, we feel that a restriction of salt in the diet of all patients in the last half of pregnancy is of decided value as a preventive measure, and deserves consideration in the general prenatal care of all patients. Maternal mortality is much too high in this and other countries, and the toxæmias are responsible for many deaths. If we can in any way reduce the incidence of the toxæmias, then we shall most certainly reduce both the maternal and the fœtal mortality. Much has already been done by prenatal care to wipe out eclampsia, and restriction of salt is simply another aid at hand towards that end. We ask the co-operation of the profession to the extent of suggesting that the practitioners throughout the country undertake this modification of the diet of their obstetrical patients. We have already been assured the whole hearted support of the Ontario Department of Public Health in this regard, and in ten years we trust that eclampsia will be one of the terrors of the past.

Hyperglycæmia in Paralysis Agitans.—In a study of eighteen cases of idiopathic paralysis agitans, reported in the *Journal of Neurology and Psycho-Pathology*, June, 1926, Hurst states his belief that the hyperglycæmia which occurs rather frequently in this condition is not related to the nervous affection, but rather to coincident involvement of the vascular system. No evidence of deficiency of liver function was revealed by the levulose tolerance test in Hurst's series.

An Address

ON

THE IMMEDIATE AND ULTIMATE PROGNOSIS IN CARDIAC DISEASE*

By Robert Dawson Rudolf

Professor of Therapeutics in the University of Toronto

WHEN an individual is told that he has heart trouble the first thing that he wants is treatment, and that having been determined upon, the next question that comes up is what about the outlook for the future.

It may at the very outset be said that whatever the lesion or cardiac derangement, the prospects depend almost entirely on the condition of the myocardium. A good heart muscle can carry on in spite of a very great handicap, while on the other hand a weak one may break down when the work required of it is of the slightest.

Of course, the very foundation of both treatment and prognosis is accurate diagnosis, which includes not only the detection of some cardiac lesion but also the sizing up of the patient as a whole. Many cardiac cases die of something other than heart disease.

There are two kinds of prognosis, the immediate and the ultimate and often one may be bad and the other good, or the reverse. For example, in conditions such as a passing toxæmia the immediate outlook is bad, and yet if the patient survives the attack the ultimate outlook may be quite good and he may attain the full duration of life as well as if he had not so suffered. On the other hand, there are many states such especially as rheumatic involvement of the heart where the immediate prospects are usually quite good and yet the ultimate may be grave, in that some damage has been done, which years afterwards will give rise to embarrassment of the circulation and so shorten life.

I.—Functional Disturbances of the Heart

In most instances when a patient *complains* of his heart no organic disease is present and the prognosis is good as regards the probable duration of life, although the disturbed state may continue to give much subjective trouble and make the patient's life a subnormal one. Something like nine out of every ten cases admitted to a military heart hospital during the War showed no signs of organic disease. The organic case more often suffers from dyspnœa, œdema of the lower extremities, cough, etc., which signs do not suggest heart to the patient, although they do so to the medical attendant.

The heart may be functionally disturbed from a variety of causes, of which the chief are probably nervous or toxic. During the War the most common heart condition was that labelled in the Army "D.A.H.", meaning "disturbed action of the heart", or "soldier's heart." This may have followed some infection such as influenza, or some toxæmia, but in most instances was really cardiac neurasthenia, and a careful taking of the medical history usually showed that the patient had for long been a neuropath, and the extra strain of active service, nervous rather than physical, had only been the last straw to bring about nerve bankruptcy. Here the heart was organically sound, but its nervous control was diminished, and treatment along the lines of raising the general nervous tone, especially in the form of carefully regulated physical exercises, in very many instances relieved the condition, although the sufferers, being already of low nervous calibre, were seldom fit for more than service behind the line.

As regards toxæmias, these may vary from just enough to produce some temporary weakening or excitability of the heart and its nervous mechanism up to the production of actual degeneration of the muscle, when the outlook becomes proportionately grave. But still, the heart has a marvellous power of recovering from such changes if only the source of the poisoning can be removed, as is seen in the relief following the treatment of

* Delivered before the Inter-State Post Graduate Assembly of North America at Cleveland, October 20, 1926.

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some focal infection or after operation in Graves' disease or toxic adenoma. In such cases, complete recovery may take place and the outlook again become good.

Disturbances of the cardiac rhythm.—Disturbances of rhythm are of various kinds and may mean little or nothing or much. The recognition and separation of the different irregularities we owe largely to the work of the late Sir James Mackenzie and his genius has brought comparative order out of what was formerly chaos.

(*a*). *Sinus arrhythmia.*—This form is characterized by the fact that the heart rate is constantly changing, usually in response to respiration. It is often called youthful irregularity and certainly occurs most frequently in childhood but it is often found in young adults and may, unless recognized, give rise to much distress. The condition has no significance; in fact Mackenzie used to teach that it was a sign of a healthy muscle.

(*b*) *Extra-systoles.*—Here the stimulus production takes place in some abnormal part of the heart and may produce auricular or ventricular extra-systoles. These premature beats may only occur occasionally, or may come in groups or runs when the condition is one of the forms of paroxysmal tachycardia. Often one sees a case where for periods the pulse rate at the wrist may be exactly half of that at the heart, an extra-systole occurring after each of the normal beats, but failing to reach the wrist. Extra-systoles by themselves mean very little, and are usually due to some passing disturbance such as indigestion, or to the excessive use of tea or tobacco, but they often complicate true cardiac disease and are then of some significance. When by the electro-cardiograph we see that ventricular ones are present in a case of auricular fibrillation the outlook is bad. In other cases auricular extra-systoles mean rather more than do ventricular ones.

(*c*) *Auricular fibrillation.*—This delirium of the auricles may be a passing condition and due to some toxæmia, as is often seen in Graves' disease, or from large doses of digitalis, but otherwise it means myocardial disease and is of grave significance. Fortunately its bad effects on the heart can usually be largely controlled by digitalis, and it may often be at least temporarily removed by quinidine, but it is a bad mark in the patient's medical history and usually means that he is far on the road towards death. All the same, the auricles have little influence in the general circulation, and if the ventricles are not unduly disturbed by the disorderly shower of impulses coming down to them from above a patient may have auricular fibrillation for a long time without becoming an invalid. The degree of distress that occurs when fibrillation first sets in is some measure of the state of the myocardium. It throws an extra load on the heart and if this is well borne we may assume that the muscle is in fair condition, while if embarrassment occurs it is an evidence that there is little reserve power left.

(*d*) *Auricular flutter.*—This again shows some degeneration of the auricular myocardium and as such is serious, but an individual may for long have the condition and yet scarcely be aware of it, if the ventricles fail to respond to the frequent orderly impulses that reach them from above. Fortunately, a degree of heart block usually is present here, and thus the ventricles are spared and may beat at the normal rate. But at any time this block is apt, from some cause, to be lifted, and then the ventricles take on the rapid rate of the auricles and will soon become exhausted if this continues. Such attacks of paroxysmal tachycardia may last from a few seconds up to hours and even days. When they stay for long, the circulation soon shows signs of failure and, especially, the veins become engorged. In one case which ended fatally after several days the veins at the root of the neck became more distended than I have ever seen otherwise. Flutter can sometimes be got rid of by the use of massive doses of digitalis, which may change the flutter into one of fibrillation, and then as the drug is eliminated the fibrillation disappears and the auricles may revert to a normal rhythm, but the flutter is very apt to return.

(*e*) *Heart block.*—Interference with the passage of impulses from the auricles to the ventricles may be due to some toxæmia as in digitalis poisoning, and in various acute infections like pneumonia and rheumatic fever; the toxins acting either through the vagus or directly on the bundle of His. But in the absence of such poisoning it signifies myocardial disease, and is of grave omen. The hypodermic use of sufficient atropin (1/50 gr.) to cut out the influence of the vagi is often of use in distinguishing between vagal and true bundle block. Smaller doses of this on the other hand, may increase the block by stimulating the vagal centres. Heart block may occur in all degrees, from a mere lengthening of the a-c interval, as is so frequently seen in digitalis administration, up to complete dissociation of the

auricles and ventricles. The seriousness of the condition depends upon the extent of involvement of the myocardium. When the changes are largely confined to the region of the auriculoventricular bundle the chief danger is from attacks of syncope (Stokes-Adams syndrome). One sometimes sees a patient with partial heart block who has for long had such seizures and who, when the block becomes complete, passes into a state of comparative comfort. I have notes of such a case, where a man for fifteen years had partial heart block with many severe attacks of syncope, but now the block is complete and for several years he has had no seizures and is able at the age of seventy-nine to do a fair day's professional work. But such cases are rare, and most of these die in a syncopal attack or go on to gradual heart failure.

(*f*) *Pulsus alternans.*—Here the rhythm is quite regular but every second beat is weaker than the preceding one. The condition usually means a profound exhaustion of the heart muscle and as such is serious. But there are several exceptions to this. In the first place it is important to know how the condition was discovered. Where this has been done by simple palpation at the wrist it means a profound degree and is very grave. Even if it only shows in polygraph tracings it is serious. But a degree of it often occurs in the tracings from a case of auricular flutter and then does not add much to the seriousness of the outlook. Again, if a tracing is made while some pressure is upon the arm as from a sphygmomanometer cuff, a slight degree of *pulsus alternans* can often be detected in acute infections such as pneumonia, and then does not mean a great deal and will probably clear up.

In judging of cardiac irregularities a good rough clinical rule is that those that clear up on exertion do not mean much.

II.—Organic Heart Disease

(*a*) *Acute disease.*—A previously healthy heart may be attacked by some local infection, or may be involved in a general toxæmia from some systematic one, such as pneumonia, typhoid fever or diphtheria. In acute cardiac infection it is being more and more realized that it is the extent of involvement of the myocardium that decides the immediate outlook. Rheumatic fever is by far the commonest form of such infection. In exceptional cases of this the muscle may be so involved that death occurs in the acute stage (this is specially so in the case of young children), but in the great majority of cases it is the endocardium, or less often the pericardium, that bears the brunt of the attack, and recovery is the rule although some structural damage remains, such as a deformed valve or an adherent pericardium, which at a later date and perhaps years after the acute attack has been forgotten will hamper the heart and eventually may lead to a breakdown. The heart in acute rheumatic infections may be said as a rule to be safe, but not sound.

In other acute infections, such as those with *streptococcus hæmolyticus*, *pneumococcus*, *staphylococcus* and *gonococcus* the immediate outlook is bad and death is apt to occur very quickly. In subacute endocarditis of the *streptococcus viridans* type death is the rule within a few months, although one occasionally comes across a case of apparently complete recovery.

In syphilis, when the heart is involved in the early stages, the outlook is fairly good if the patient can stand active specific treatment. Tertiary cases are much more grave and death usually occurs within five years after cardiac symptoms have set in.

(*b*) *Chronic organic disease.*—Where signs of chronic heart trouble are found, such as hypertrophy, alteration in the heart sounds, etc., the question of prognosis is very important and here again this depends very largely on the present or future condition of the myocardium. As regards murmurs, a pessimist might say that on the whole the introduction of the stethoscope did more harm than good in that it directed the practitioner's attention to one sign almost to the exclusion of the rest of the clinical picture. The detection of murmurs became for long almost the only object of physical examination, and it is terrible to think how many invalids have been made during the last hundred years through the discovery of murmurs which *may* have meant leakage or obstruction, but which lesions were of themselves perhaps of little importance. Systolic murmurs have little significance in the absence of other signs; especially is this true in regard to the very common one in the pulmonary area. In the mitral region it means leakage backwards into the auricle which may be temporary or permanent but in the absence of hypertrophy it means little. In the aortic area it means little unless accompanied by a thrill, when it has some bearing on the future. Signs of mitral stenosis are of considerable gravity especially as the lesion is apt to be progressive. Such patients seldom reach the age of fifty.

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Aortic regurgitation is usually of grave omen, but the seriousness depends, of course, on the amount of leakage and this may be gauged somewhat by the degree of collapse of the pulse between the beats. Much indrawing of the precordium during systole suggests extensive pericardial adhesions which hamper the heart and may lead to great hypertrophy. As regards hypertrophy, we were taught as students that it was a disease requiring treatment, but now it is looked upon as an organic reparative response to some extra heart load and under the circumstances is the best thing that can happen. We should try to lessen the load rather than to relieve the hypertrophy.

In every case where organic heart disease is detected it is necessary to see how well this organ is bearing up under its extra burden. Often some lesion is found during life insurance examination and the applicant may be truly astonished when his application is refused or his life is "loaded." On the other hand when the patient is first examined, he may be having symptoms of cardiac embarrassment (of which the commonest is breathlessness on exertion); and signs of overfilling of the venous system may be present, such as cyanosis, œdema, enlargement of the liver, etc. Most cases of heart failure show auricular fibrillation and this extra load has probably precipitated the breakdown. It follows that when failure occurs while the rhythm is regular the myocardium is far gone, and as a matter of fact few of these last more than eight months after the appearance of the œdema.

The Martius' diagrams are useful in explaining to students the degree of heart power and also can often be shown with advantage to intelligent patients.

FIG. 1.

FIG. 2.

FIG. 3.

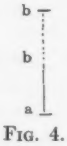

FIG. 4.

The first figure represents the normal heart. a-b is the work that the organ must do when the person is at absolute rest; b-c is the reserve power for extra work. A large amount of strain can be put on such a heart without the reserve becoming exhausted. Figure 2 represents a heart in which there is some lesion which causes the minimum work to be greater than normal as shown by a-b, but there is still plenty of reserve power (b-c) for emergencies. In fact for a time this may actually be greater than the normal owing to compensatory hypertrophy. Compensation in this heart is good and the immediate prognosis is excellent, but the ultimate one may be poor, for such a heart carries a handicap, which some day may tell if the myocardium becomes weakened by any intercurrent factor. Moreover, secondary infections are more apt to occur at the damaged valves. Often auricular fibrillation sets in and may turn the scale. Such a failing heart is represented by Figure 3, where the reserve power is gone and the patient can only be comfortable when at rest. I always add a fourth figure showing a heart that is going down hill in spite of rest. Here a-b represents all the power it has and yet a-b is necessary in order that it may carry on. This is the case that is going from bad to worse in spite of rest and treatment.

Now, as I say, an intelligent patient may often be shown at least the first two figures and the fact thus impressed upon him that the extra work that his heart must do on account of its lesions can best be met by keeping the muscle unstrained and in the best possible condition, and that hence excessive eating and drinking, smoking, etc., should be avoided, and on the other hand gentle pleasurable exercise, and lots of sleep and rest will all help to keep it in the healthy state that is required.

Electro-cardiographic studies have some bearing on prognosis besides revealing the nature of many obscure arrhythmias. T-wave inversion, especially in derivation I is of grave significance. An aberrant QRS complex in all derivations is bad.

The most practical tests of where a patient stands in regard to heart reserve are first of all his history, and next the careful use of graduated exercises. This method, which was so highly developed in the army, is of infinite value in ascertaining the immediate prognosis, but of less use in judging of the ultimate outlook. The following case illustrates this point. An officer was invalided from France to England after slight "gassing." When being boarded he was found to have an enormous heart with a double aortic and a double mitral lesion, and the pulse was of the "water-hammer" type. His history was that at the age of twelve he had suffered from rheumatic fever and afterwards was kept in bed for a year on account of a bad heart. He recovered and soon was captain of his school foot-

ball team and later of his college one. Somehow he got into the army and served for over two years at the front. While there he was captain of his battalion football team and during some sports won various events and was presented with a gold medal as the best athlete present. In this man the immediate prognosis was excellent and he could have stood any physical tests, but what about the future?

As a rule cases showing symptoms early in life last longer than do those who are older, as in the latter degenerative changes are apt to be present.

III.—Angina Pectoris

True angina pectoris as originally described by Heberden is usually easy to diagnose. The patient, usually a man between forty and fifty years of age begins to have pains about the heart radiating down the arm, which cause him to stop in his tracks and which are most apt to come on after exertion, especially following a heavy meal or when taken in the cold air. In such a case we can assume that there is narrowing of the coronary arteries or disease at the root of the aorta. He may have a high blood pressure, but this is not necessarily the case, and, by the way, the outlook is worse when the attacks occur in its absence. Such people in exceptional cases may die in a first attack, but many live for years although the chances are against the latter. Occasionally, one sees such a typical example as the above apparently clear up completely (especially when some evident mental or physical strain has been removed), but the odds are that the trouble is only in abeyance and may recur at any time.

It is in the atypical cases that the physician has the greatest trouble in assessing the seriousness. I saw some years ago a man of about sixty years of age who was having severe attacks that seemed typical, except that they usually came on while he was at rest, and then caused him to become restless and to walk about. This fact made me think that the condition might be rather one of false angina and I gave a hopeful but guarded prognosis to his doctor. A few nights later the patient while in bed felt an attack coming on and as usual got up and walked about the room, but this time he fell dead.

True angina is rare in women but does occur, especially when the blood pressure is high.

I have purposely not burdened this paper with statistics, because although a wealth of insurance and other tables exist from which one can say how many cases of a certain class of disease are likely to last so long, nothing is more misleading than when one comes to apply such figures to individual cases. Many cardiac patients keep going year after year when according to the law of average they should long ago have thrown up the sponge. Any practitioner of experience can recall many such, and, by the way, what a wealth of evidence might be obtained if the individual experiences of the members of such an audience as this could only be pooled!

I can call to mind many people who lived on when all statistics were against them. Some I have already mentioned, but will add two or three more. Such as a man who all his adult life had suffered from aortic regurgitation, and yet lived healthily until the age of eighty-two when he died of angina pectoris. Another, a young fellow whom I invalided home from India with double aortic disease and who was well thirty years afterwards although he has since died. A lady who came in 1905 complaining of palpitation and pain about the heart and who was found to have mitral regurgitation with such cardiac hypertrophy that the apex could be felt heaving in the midaxillary line. I have not had the opportunity of examining her recently but hear that she seems well and she is now well over seventy.

All such cases make one very cautious about giving a bad forecast of the future. Prognosis depends upon so many factors of which we may in a given case have discovered only a few. Age, sex, family history, habits, environment, occupation and especially treatment have so much bearing on the outlook.

The practitioner of immense experience although he may not be versed in the latest instrumental methods of diagnosis can often give a sounder forecast than can his more up to date younger colleague. He has accumulated what one may call acquired instinct born of numerous, experiences now perhaps forgotten, but yet influencing the judgment. Thomas Hardy's farm labourer (in "A Pair of Blue Eyes") is an example of such acquired instinct. Speaking of how such a man can often tell the time without a watch, he says: "I have known farm labourers who had framed complete systems of observations for that purpose. By means of shadows, winds, clouds, the movement of sheep and oxen, and a hundred other sights and sounds which people with watches in their pockets never know the existence of, they are able to pronounce within ten minutes of the hour at almost any

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required instant." We all know what good forecasters of the weather sailors and farmers are. In much the same way the experienced practitioner can often by observing little symptoms and signs that others miss, size up a case and its future with great accuracy.

We should all be optimists. R. Murray Leslie would have us make our prognosis at least 50 per cent better than the circumstances seem to warrant. A gloomy view may precipitate heart failure when otherwise this might have been avoided for long. Also, how many cardiac hypochondriacs owe their condition largely to some indiscreet and probably unwarranted opinion expressed by one of us!

That delightful but neurotic French writer, Amiel, wrote thus gloomily: "What doctor possesses such curative resources as are latent in a spark of happiness or a single ray of hope." He must have had an unfortunate experience of our profession for is it not our duty and privilege to stimulate just such hope and happiness, which may often do more for the sufferer than all our medicinal therapy?

An Address

ON

THE PRESENT POSITION OF THE CANCER PROBLEM*

By James Miller, M.D., F.R.C.P. (Edin.)

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To epitomize within the space of a single lecture the present position of the cancer problem is an utterly impossible feat. To deal even with the restricted sphere of the pathological aspect of this great question would occupy too much time and space. All that the author can hope to do is to touch upon some of the more important matters which have a practical bearing from the point of view of the medical man.

There is no necessity to labour the importance of the problem for the doctor and for the community at large. The total number of deaths in Canada from this cause alone is about 6,000 annually, (McEachern.[1]) It has been estimated that in England one man in eleven who reaches the age of forty-five years and one woman in eight must look forward to die of this dread disease. More recent statistics for the United States confirm these statements. And the depressing fact is that the disease is increasing. While we may state with confidence that we have complete control of diseases such as typhoid fever, diphtheria, and scarlet fever so that given sufficient powers and money we could at any time stamp them out completely and while we can legitimately claim that the death rate from tuberculosis has been halved during the last thirty years, in a similar period the death rate from cancer has been increased by at least one-half. The latest official statistics from the United States[2] show that during the years 1900-1920, in ten states "there has been an apparent steady increase in the cancer mortality rate, which on the basis of the crude death rate amounts to 56 per cent." It may be claimed that increasing accuracy in diagnosis is partly responsible for this rise. In connection with this it is stated in the bulletin that "In persons forty years and over, in whom 90 per cent of all cancer deaths occur, about one-third of the increase may be ascribed to this increasing precision in death certification." This leaves us with a net increase of 37.4 per cent in a period of twenty years. The statement is made (*Brit. M. J., loc. cit.*) that in Ontario the annual increase in cancer death rate is 3.1 per cent, but this apparently takes no cognizance of increase of population and other factors. Look at it as we will, however, the situation is a profoundly disquieting one.

The statement is often made when dealing

* Delivered before the annual meeting of the Canadian Medical Association, Victoria, B.C., 1926.

with this matter that in spite of the importance of the question we know little more about malignant disease than we did say thirty years ago, and this in spite of the fact that hundreds of workers in all parts of the world have been concentrating upon the problem. Now this is not fair to these workers counting amongst their numbers as they do some of the keenest intellects in scientific medicine, for although it must be frankly admitted that up to date there is no certainty as to the cause of the disease, still, much has been learned as to its nature, its mode of growth and methods of dissemination, which has practical applications for the medical man.

Cancer may be defined as a lawless, aimless, irresistible multiplication of cells within the body. It starts as a localized condition, the rebellion from the normal system of rule and order being confined in the beginning to a small group of cells. It is not a miasma which spreads from cell to cell. The primary growth and the various metastases are composed of cells all derived from the original malignant cell or mass of cells. There is a cheering message for the surgeon in this because if he but gets the condition early enough he can hope for cure. There is a point in the already mentioned bulletin which bears this out. Tables are given which show that "the highest percentage increases were registered in cancers of inaccessible sites such as the peritoneum, intestines and rectum." But the report goes on to say that "cancers of accessible sites such as the breast and buccal cavity were not far behind." How many more of these latter would have been saved had the patient come earlier to the surgeon with his or her swelling it is impossible to say.

Characters of the cancer cell.—Now a curious point is this, that however closely we may scrutinize the cancer cell, staining it with the most modern methods so as to bring out its finest histological detail, we can see no essential differences between it and the normal cell. It frequently differs in size both as between its fellows and its prototype; it shows a marked tendency to pass the limits which bound its normal ancestor, but in its essential details of protoplasm and nucleus it differs in no respect from the corresponding normal cell. Ludford[3] has written an exhaustive paper on this subject. He has studied the characters of cancer cells in the tumours themselves, and in cultures *in vitro* from tumour, and neither as regards the finer details of the protoplasm, such as the mitochondria or the Golgi apparatus, nor as regards cell inclusions, nor as regards the nucleus in a resting stage or in division are changes found which can be said to be peculiar to the cancer cell. He concludes thus: "With our present microscopic technique there is no means of distinguishing between a normal and a cancerous cell. The wide range of pathological variations are the morphological expression of the reaction of the cells to the peculiar conditions of tumour growth. There is no pathological state restricted to cancer cells alone, so that there exists for the cancer cell no precise morphological diagnostic character of any kind."

Cancer in animals.—The first important step of advance in our knowledge of cancer was taken in 1902, when Jensen described spontaneous tumours in mice and proved that these histologically cancerous growths were inoculable from animal to animal. Much that is useful has been learned from a study of these tumours. One point is that the inoculability of the growth is restricted to the species of animal in which it arises, and often to a particular variety of that animal. Spontaneous malignant growths may arise in fishes, amphibians, reptiles, birds and in many species of mammals. But the disease arising in one animal cannot be inoculated successfully into the tissues of another animal of a different species. All attempts to inoculate human carcinoma, for example, into the lower animals have failed. The inoculability of the tumour is often confined to a particular breed of a species. If we take the Rous sarcoma of the fowl, of which more below, its inoculability was at first confined to the Plymouth Rock variety of fowl. It has occasionally been possible successfully to inoculate a rat with a mouse tumour but such an occurrence is most exceptional. An interesting point is, as to whether man can be inoculated with cancerous material from a human source. The matter is not unimportant from the point of view of the operating surgeon. A supposed case of this kind has been described in literature recently.[4] A male medical student in removing fluid from a wound after amputa-

tion of a breast for carcinoma drove the needle of the syringe into the palm of his left hand. The wound was cauterized, it healed and remained unaffected for two years. Then a swelling developed in the scar and a month later an enlarged gland appeared in the left axilla. This was removed and both it and the primary growth proved to be malignant, but the curious thing was that whereas the mammary tumour was an encephaloid carcinoma, the growths in the student showed the characters of a spindle cell sarcoma, although the mode of spread (by the lymphatics) was more in keeping with the characters of a carcinoma. Now in inoculating mouse tumours from animal to animal a change in type from carcinoma to sarcoma has been occasionally observed. But this has been proved to be due not to an alteration of the epithelial cell into a sarcoma cell, but to the assumption of malignant characters on the part of the stroma cells of the tumour. This record of inoculation from human to human is not entirely convincing, and one would imagine that if such a thing does occur at all it must be rare, as surgeons cut and prick themselves probably quite as often while performing operations on cancer cases, as they do in other types of disease. Sepsis acquired in this way is frequent, malignancy surely is very rare.

To return to the inoculable tumours in mice. From the study of the behaviour of the implants or grafts as they are called, it has been found that it is not the whole piece of tissue, which grows in the animal into which it is inoculated. Some of the cell elements of the graft die, and others live and produce the new tumour. It is the stroma cells, the connective tissue cells and blood vessels which die, while the epithelial cells of the tumour, the essentially cancerous portion, go on living and propagate themselves. The epithelial cells, however, cannot go on multiplying alone indefinitely, they must have support and they must have nourishment. They must find a new stroma and new blood vessels. They cannot supply these from their own resources they must induce the new host to give them, and supposing the new host refuses to do so, the cancer graft dies. This, as has been shown by Bashford, is the fundamental reason for the immunity of some animals to grafts. Their tissues refuse to supply the tumour with what it requires—stroma and blood vessels. How is it that the cancer cell can often induce the normal tissue in which it finds itself to do this thing, which is so fatal to its best interests? It is apparently because the cancer cell secretes a growth-stimulating substance. If one of these mouse cancers is crushed, extracted with saline and centrifugalized a growth-stimulating body is found in the supernatant fluid, which will actually cause increased rapidity of growth in an embryo kidney. And apparently the more malignant the tumour the more of this substance there is in the growth (Drew see Ludford *loc. cit.*). An extract from a tumour will also, when injected, increase the number of successful grafts, and at the same time stimulate the growth of the transplanted tumour, (Chambers and Scott.[5]) The fact that tumours develop only in certain animals while others remain immune raises the question of heredity in relation to cancer.

Heredity in cancer.—Before dealing with this aspect of the problem let me emphasize the difference between a tumour arising *de novo* (spontaneous tumour) and a tumour which grows from a graft taken from another animal. The former is derived from the animals' own tissues, both the stroma portion and the epithelial elements. Most of the spontaneous tumours in mice have arisen in the mammary gland, but they also arise in other sites such as liver, lung, thyroid, etc. In the case of the inoculated tumour, only the stroma and vessels are the animals' own product, the cancer cells have been derived from another mouse which died perhaps fifteen years before; the cancer cells having been kept alive by inoculation from animal to animal all these years.

Tyzzer has shown that the susceptibility of a mouse to inoculation with a certain tumour could be transmitted to its offspring, even though the other parent were insusceptible. As regards the spontaneous tumours, Murray proved that mice whose immediate ancestors had developed these tumours, were much more likely to develop them than those in whose pedigree there was only a remote cancerous taint. It is however to Dr. Maud Slye of Chicago that we owe the most painstaking and elaborate study of this question. Dr. Slye has been engaged on a study of spontaneous tumours in mice for over fifteen years, and she has accumulated an immense amount of evi-

dence on the matter. It should be stated that the spontaneous tumours arise in mice as in man chiefly in old age. To put the matter in a sentence, Dr. Slye claims that the tendency to spontaneous tumours is transmitted according to Mendel's law and behaves as a recessive character. It would prolong this paper beyond the bounds of what is permissible to explain fully what a Mendelian recessive is, but the matter may be put in this way, (Slye.[6]) If a Cancer-susceptible animal is mated with a cancer-resistant one, no cancer will appear in the offspring, because cancer resistance is a dominant factor and cancer susceptibility is a recessive one. The family will all be what Dr. Slye calls hybrid cancer-resistant individuals and will not develop tumours. If, however, two such hybrid cancer-resistant individuals are mated, a certain small proportion of the offspring will be cancer susceptible. In the case of double cancerous parentage (both parents cancer-susceptible) all the offspring will develop tumours provided they live long enough. The question now arises have these facts any importance from the point of view of inheritance of a cancer tendency in man? We know that Mendel's law does apply to man. A large number of characters, such as the colour of the hair and eyes, are transmitted in this fashion. We also know that certain pathological conditions, such as polydactylism, congenital cataract, colour blindness, etc., follow Mendel's law of inheritance. Spontaneous cancer in the mouse is, so far as we can judge, the same disease as cancer in the human subject. Any biologist would therefore say that in all probability the tendency to cancer is inherited in man much in the same way as it is in the mouse. Karsner[7] in his recently published text-book states, "The evidence available supports the inference that the laws established by Slye are probably applicable to man." But surely this is a matter upon which the practising doctor should have something to say. Probably most practitioners of experience will recall instances of cancer families. The most famous of such families in history is the Bonapartes. Napoleon himself, his father, his brother Lucien, and two of his sisters, Pauline and Caroline, all died of cancer of the stomach, (Fenwick.[8]) There can be little doubt then that heredity bears a part in the incidence of cancer in man. In man it may not be the simple mode of transmission which Dr. Slye claims for the mouse, but heredity is one of the factors which like age and irritation play their part.

Age and sex in relation to cancer.—We know that age plays an important rôle in the development of cancer, the vast majority of cases of malignancy occurring after middle life; 90 per cent of the deaths occurring after the age of forty years, according to the statistics given above. As is well known, this applies especially to the carcinoma, the sarcoma being relatively frequent in children, and young adults. A number of cases of this type have been actually found at birth. These are usually bone sarcomas and the interesting and rare blastocytoma of the kidney. Even carcinomas occasionally occur in early life. A large number of breast and intestinal malignant growths have been described in young adults, but such tumours are rare in infancy. One such an epithelioma arising in nasopharynx, has been described recently in a sixteen months old child, (Rosenbusch.[9]) A malignant tumour with a curious age incidence is the chorion-epithelioma of the male. As is well known such tumours are common enough in the female following pregnancy, abortion and hydatid mole. But they also occur in the male always apparently in relation to a dermoid cyst and usually in the testicle. By far the larger proportion of cases described up to date, have been in young men about the age of twenty, (Miller and Browne.[10])

As regards sex, as indicated above, cancer is more frequent amongst females than amongst males. Ellis Barker[11] quotes the following statistics from a government report "On the State of the public Health, 1923, for England and Wales," p. 14.

ANNUAL MORTALITY FROM CANCER PER MILLION LIVING

	Males	*Females*
1891-1900	639	882
1901-1910	784	942
1911-1920	936	996

The figures as regards the decades previous to 1890 have been omitted as being probably less reliable. Those given show not only the discrepancy between the two sexes but the

steady increase in the disease. This higher percentage of cancer in the female sex is due to the great frequency of the disease in such organs as the breast and uterus. The fact that other forms of cancer are more frequent in the male does not alter the general position.

This relative preponderance of cancer in the female sex does not hold good for all countries. Cancer statistics in Switzerland[12] show that between 1901 and 1920 the proportion of deaths from cancer is the same in both sexes. Ellis Barker (*loc. cit.*) states that the same is true of Japan. This is a matter which requires further study by our statisticians.

Injury and irritation in relation to cancer.—Trauma as a factor in tumour formation, and more especially in malignancy, has always been accepted, perhaps a little too readily. Mock and Ellis[13] subject the histories of a series of 300 supposed traumatic tumours to a close analysis. They suggest certain points which should be considered when questions arise as to claims for compensation and on the bases of these tests they accept nine only out of the 300 as neoplasms probably related to trauma. Many would consider the postulates laid down by the authors as erring on the side of strictness. But the net result that only a very small proportion of tumours can be causally related to trauma is no doubt correct. MacCallum[14] taking a conservative view of the question states that in view of the thousands of injuries not followed by neoplasm it may well be questioned whether the connection is not an accidental one.

Chemical irritants.—We now come to the question of chemical irritation in relation to cancer. The evidence on this point is partly derived from observation of cases occurring in certain trades and occupations partly from experimental results in animals. It has long been known that workers in paraffin, tar, shale oil, etc., were apt to suffer from skin cancers in various parts of the body, but it is only recently that the condition has been produced in animals by painting the skin with chemicals. This was demonstrated first by Fibiger and later by two Japanese workers, Yamagiwa and Ishikawa. A good account of this work is to be found in a paper by Cramer.[15] If a small area of the skin of a mouse is painted with tar two or three times weekly for a period of some months a typical epithelioma will develop in 60 to 80 per cent of the animals. For the first three or four months little is visible to the naked eye in the painted areas although microscopically hyperplasia of the epithelial cells can be demonstrated. About the fifth month one or two small warts may appear. Even if painting be now discontinued the warts will grow, then coalesce, and subsequently develop into an ulcerating epithelioma with hard infiltrating margins. If the animal live sufficiently long metastases may be found in lymph glands and lung. The length of time necessary to produce this result in a mouse varies from five to nine months. Some mice appear to be resistant to the action of the tar, and never produce either a papilloma or an epithelioma. As Dr. Cramer says (*loc. cit.*) it is surely a significant fact, demonstrating the identity of the disease in man and animals, that the same agents which produce cancer in man will also produce cancer in certain species of animals. Dr. Cramer further suggests that as it requires on the average six months from the commencement of the chronic irritation till the cancer appears in the mouse, and as the span of the life of a mouse is about three years this gives one-sixth of the life span as the average period necessary for chronic irritation to act before cancer develops. With a life span of seventy years in man this would give about twelve years as the average time required for chronic irritation to develop into cancer in the human subject. We know of course that this is not always so. Chorion-epithelioma usually follows pregnancy or abortion within a few months, but it has been known to delay as long as twenty years. One has not infrequently seen epithelioma start in relation to a syphilitic or a varicose ulcer, or an x-ray burn, and it would be interesting to find out whether the incubation period corresponds to the above calculation. The difficulty however is to ascertain the exact point at which the lesion in man becomes malignant. In this connection some interesting statistics are available as regards the period that a man can be employed in one of these cancer-producing trades before the disease develops. Such statistics are available in connection with what is called "mule

spinners'' cancer. In the mule spinner the disease most commonly affects the scrotum, that portion of the body being often smeared with oil through the clothing. The statistics are to be found in a report from *H. M. Stationery Office,* London, 1926. The shortest period of time which elapsed before cancer developed in the case of persons employed only as spinners was ten years, the longest sixty-three years. These results rather confirm Dr. Cramer's calculation.

Tar and oil are not of course pure chemical substances and it is interesting to enquire as to what particular element in them is the cancer producing one. Dr. Leitch of the Cancer Hospital Research Institute, London, has investigated a number of different oils and his results are given in the above mentioned report. He obtained positive results (cancer in animals whose skins were painted) with (a) all fractions of Scottish shale oil except lamp oil (b) petroleum from Borneo, Assam, Burma, Badarpur and Egypt; and (c) among refined oils of unknown origin, by a fuel oil and two lubricating oils; negative results were given by (a) petroleum from Russia, Galicia, California, Mexico, Egypt and Persia, and (b) among refined oils, by medicinal liquid paraffin, petrol, a vaporizing oil, and a very light lubricating oil. Negative results are of course less conclusive than positive. Some animal and vegetable oils including olive oil, sperm oil, lanolin, sebaceous oil and lard were tried with negative results.

As regards tar it has been found that the arsenic which tar often contains is not a cancer producing factor, (de Coulon.[16])

Immunity in cancer.—Many interesting facts have been ascertained as regards rendering animals more and less susceptible to inoculated tumours by experiments on mice. For example, animals may be rendered less susceptible to tumour grafts by inoculating them with vaccines of normal adult or embryonic tissues. The degree of resistance produced in the latter instance varied with the closeness of the relationship between the normal tissue used as vaccine, and the tumour subsequently inoculated. For, example skin protects best against skin cancer. What happens apparently in these artificially protected animals is that the animals' own tissues fail to supply the tumour graft with the necessary stroma and blood vessels. The tumour graft dies because it fails to induce the host to give it what it requires.

Pregnancy has been found to be unfavourable to the growth of cancer grafts. Advanced age is unfavourable to the inoculated tumour in contrast to the spontaneous tumour which appears with greater frequency as age advances. Another point of difference between the two types is that a spontaneous tumour may develop in an animal resistant to inoculation with a tumour graft.

A grafted tumour may grow for a time and then retrogress and disappear. An animal in which this has happened is now resistant to a second graft. It is found that grafts show a certain periodicity in their growth and that they are more susceptible to the action of destructive agents during the negative phase of their activity. Injections of the serum or plasma of immune animals cannot prevent the growth of tumours.

It would appear from the work of Murphy and others that the presence of lymphocytes in the tissues has something to do with resistance to cancer. Animals with an artificially induced lymphocytosis become as highly resistant to cancer implants as do animals vaccinated with tissue injections. Susceptibility to tumour implantation is enormously increased by destruction of lymphocytes through exposure to x-rays. Areas of tissue exposed to the action of x-rays and subsequently proved to be infiltrated with large numbers of lymphocytes showed an unusually low percentage of successful implants. Murphy has further shown that the chick embryo will not resist implantation of tumour grafts until the spleen and lymphocytes have appeared, but the implantation of a fragment of lymphoid tissue into the body of the embryo renders it as resistant as the adult. This notion that lymphocytes have to do with resistance to cancer receives support from the well known fact that the tissues in contact with a spreading carcinoma in the human subject are infiltrated as a rule with lymphocyte-like cells.

One of the most significant observations in this relation has been made by J. A. Murray.[17] If the skin of animals is painted for a sufficiently long time, as already stated, a large percentage of the animals will develop epithelioma. If several areas of skin are painted at the same time in the same animal

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multiple tumours will develop. If however, the tar cancer is removed by operation before it has produced metastases, subsequent painting with tar fails to produce another tumour. Dr. Murray then went further; he took a number of mice with mammary carcinoma which had developed spontaneously and he did a radical operation, removing the entire growth. These mice were also found to be resistant to tar carcinoma. These observations may have a practical bearing upon cancer in the human subject. They suggest that if a cancer occurs and is removed successfully it is improbable that a second one will develop. A number of observations have been made upon multiple malignant growths in man although such are rare. But what about a second cancer appearing after the removal of a malignant tumour? Riedes[18] publishes three cases of this type, as follows: (1) operation for removal of right arm for sarcoma; twenty years later, carcinoma of left ovary; (2) resection of carcinoma of splenic flexure of colon; eleven years later primary carcinoma of pylorus; (3) extirpation of rectum for carcinoma; twenty years later, primary carcinoma of stomach. It would seem that there is here some antagonism between experimental facts and observations on the human subject but further work may clear this up.

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Silent Pulmonary Cavities. — Raphael A. Bendove, Denver, states that about half of all pulmonary cavities in tuberculosis are silent; *i.e.*, they lack all the classic signs of cavitation as given in any standard text-book on physical diagnosis. These silent cavities are of at least two kinds: (a) absolutely mute, that is, those which exhibit no adventitious breath sounds at all, and (b) relatively silent, that is such cavities that lack the classic cavernous signs, but manifest other adventitious sounds such as bronchovesicular breathing and moist râles. Many factors are no doubt responsible for the variable signs of these cavities, the most important of which are: obstruction of the afferent bronchus by fibrosis or mucopurulent material, soft ragged capsules which fail to respond to the vibrations of the inrushing air, changes in medium of conduction of the breath sound produced by surrounding pneumothorax, and emphysema. Physical observations should always be corroborated with roentgenology, as this is the surest way of diagnosing these so-called silent cavities. There is, as yet, no single sign which could be considered pathognomonic for such cavities, but a certain group of signs taken collectively speak strongly of the presence of cavitation. Bronchovesicular breathing, or harsh inspiratory sound with moist bubbling râles over a limited area in any zone of the pulmonic field below the second rib is very suggestive of a cavity. The prognosis of these cavities varies; the small, absolutely mute cavities are of a much more favourable prognosis than the relatively silent cavities with changeable physical signs. When the patient gives a history of a stormy course of short duration and a relatively silent cavity with ragged capsule is found, it bespeaks a poor prognosis. Frequent roentgenoscopic observations plus repeated physical examinations of the chest are necessary in order to formulate a correct prognosis.—*J. Am. M. Ass.*, Nov. 20, 1926.

The Nobel Prize of the value of 37,000 dollars has been awarded to Dr. J. Fibiger, professor of morbid anatomy at the Copenhagen Faculty of Medicine, whose experimental production of carcinoma of the stomach in rats by a nematode is a milestone in the history of the study of cancer.—*Brit. M. J.*, Nov. 13, 1926.

An Address

ON

THE PRE-OPERATIVE PREPARATION OF THE DIABETIC PATIENT WITH DISCUSSION OF THE "SO-CALLED" DIABETIC GANGRENE*

By Edward H. Mason, M.D.

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THE diabetic patient is an individual living with a greater or less margin of reserve, this margin being in proportion to the severity of the disturbed pancreatic function. Many well controlled cases have sufficient reserve function to meet the various accidents of ordinary life; others, fundamentally more severe, exist "on the brink of a precipice," the least "slip of a foot" leading to disaster. It is the duty of all physicians handling cases of diabetes mellitus to maintain them in a state of nutrition whereby their maximum reserve function is realized, and this can only be accomplished through a good state of general nutrition, approximately a normal blood sugar, and freedom from ketosis.

For many years the diabetic individual has been considered to be especially susceptible to infections leading to surgical complications. This holds true to-day, I think, in the improperly controlled case, while I believe that the well treated case is no more susceptible than the non-diabetic individual.

Nevertheless, attention to minor details in the daily hygiene of the diabetic patient should not be overlooked. This is a prophylactic caution which if neglected will lead to trouble. Prompt attention to small pimples and boils, cleanliness of the skin, and the daily hygiene of the feet, so well emphasized by Joslin, are measures concerning which instruction is due to every diabetic.

Most diabetics who develop surgical complications peculiar to their diabetic state fall into two classes:

First class.—Young individuals who fail to live up to a strict dietetic regime.

Second class.—Individuals beyond fifty years of age, who, either have a low grade diabetic condition of at least several years standing which has never been considered seriously, an error for which the doctor is largely responsible, or patients who break their diet allowing themselves to have persistent hyperglycæmia. Unfortunately the majority of the major surgical complications to-day develop in patients of the first group of the second class, namely, individuals well advanced in years, who have had a low grade diabetes that has never been strictly controlled. And, of these, the most important complication is gangrene.

The preparation of the diabetic patient for operation will not be considered for the "emergency," as such form only a very small percentage of the whole. In most instances there is plenty of time to act. Theoretically the patient should not be dehydrated, nor should the reserve glucose depots in the form of glycogen be exhausted by prolonged semi-starvation. Also, there should be no ketosis. The level of the blood sugar, so long as it does not exceed 0.2 per cent, is of not much importance. An abundant intake of water, at least 2000 c.c. per day will prevent dehydration; a diet containing at least one gramme of carbohydrate per kilo of body weight, supplemented with insulin to ensure oxidation in part, and storage of the remainder, will maintain a satisfactory glucose reserve; and will also abolish ketosis if present. Thus on the day of the operation the patient has a good fluid balance, some glycogen reserve, no ketosis, and an approximately normal blood sugar.

* From the department of medicine, McGill University Clinic, Royal Victoria Hospital, Montreal. A paper read at a sectional meeting of the Congress of The American College of Surgeons, held in Montreal, October 25 to 29, 1926.

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Immediately preceding the operation I believe it to be wise to administer an additional ten units of insulin.

The anæsthetic employed is of considerable importance. Avoid chloroform always, and ether if possible. Use gas, gas and oxygen, or a local anæsthetic. In well controlled cases, if it is necessary to administer ether for a brief period of time, it can be done with safety. Following ether anæsthesia in any diabetic five per cent CO_2 in oxygen or air should be inhaled, until, through the increased pulmonary ventilation, all the ether has been removed from the tissues.

The post-operative period is as important as the pre-operative. Maintain freedom from glycosuria if possible, and from ketosis of any degree of severity always. This can be accomplished through diet, fluids, and insulin. The post-operative complication of vomiting is especially to be guarded against, and if nausea persists perform a gastric lavage before vomiting begins. Vomiting once well established dehydrates rapidly, converting a mild ketosis into a severe one. The post-operative diet should be gauged according to the carbohydrate tolerance of the patient, giving fluids and softs at the start. Milk as a sole food is not especially suitable for this period as it is relatively high in carbohydrate.

To illustrate more clearly the pre-operative and post-operative periods in a series of diabetics undergoing surgical interference a series of six charts follow which are self explanatory. Charts 1 to 4 inclusive are typical of the results obtained with major operations. Charts 5 and 6 show the findings in two cases having multiple operations. In all the charts the "G" of the diet is the total glucose yield of the same derived from Woodyatt's formula: glucose = carbohydrate + 0.58 protein + 0.1 fat.

"So-called" diabetic gangrene.—The major surgical complication of diabetes mellitus to-day is gangrene, almost always of the lower extremities. It usually develops in the untreated, or poorly treated cases. Most of these patients develop glycosuria after middle life. Associated with the reduced carbohydrate tolerance and hyperglycæmia there is a concomitant arterial change. In many cases I think that the arterial change is primary, the hyperglycæmia and glycosuria being secondary to arterial change in the pancreas. As the years pass by and structural alteration in the vessels becomes more marked, hyperglycæmia becomes more con-

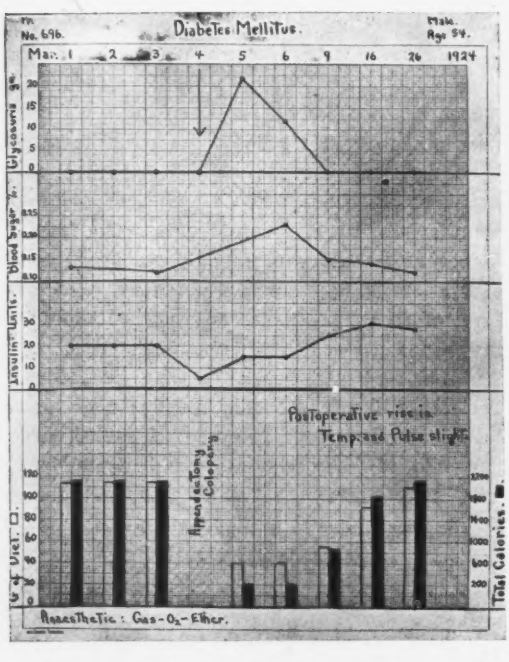

CHART 1.—Diabetes mellitus and chronic appendicitis. Moderately severe case. Duration of diabetes three years.

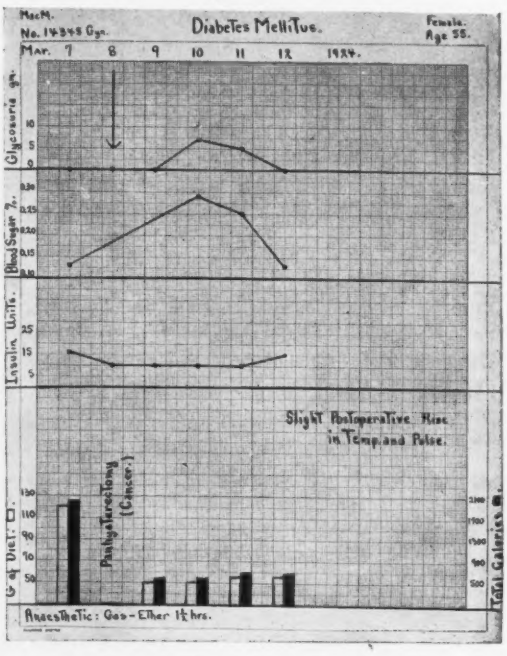

CHART 2.—Diabetes mellitus and cancer of the cervix. Duration of diabetes four years. Moderately severe case.

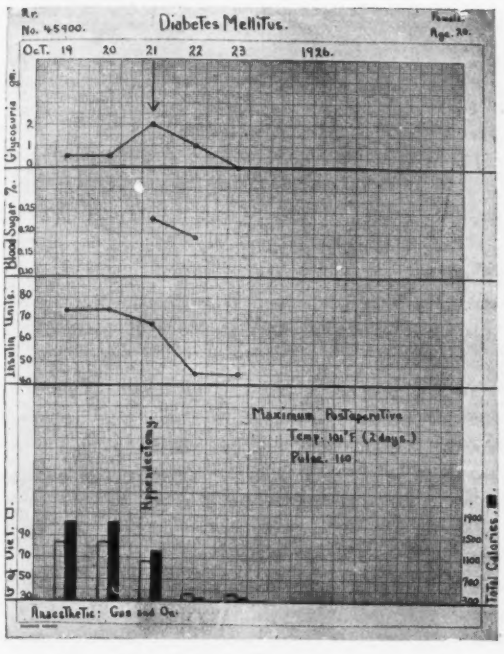

CHART 3.—Diabetes mellitus and chronic appendicitis (tuberculous). Duration of diabetes five years. Severe case.

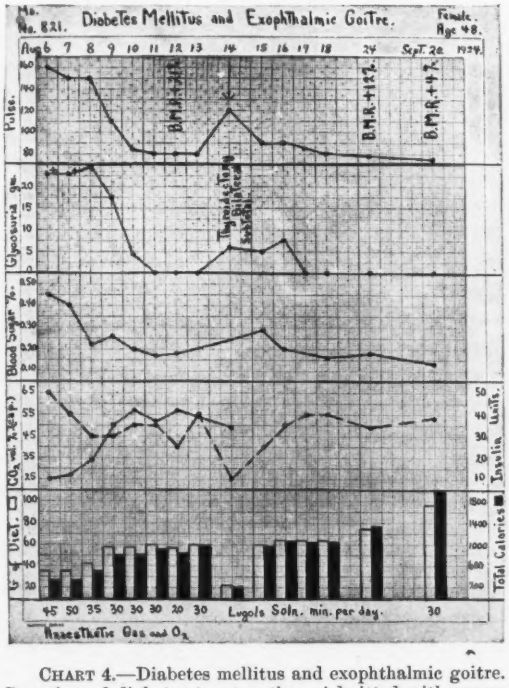
Diabetes Mellitus and Exophthalmic Goitre.
Aug. 6 7 8 9 10 11 12 13 14 15 16 17 18 24 Sept. 28 1924.
Pulse.
B.M.R.+32.
B.M.R.+122.
B.M.R.+47.
Glycosuria gm.
Blood Sugar %.
Insulin Units.
Thyroidectomy. Bilateral Excision.
45 50 35 30 30 30 20 30 Lugols Soln. min. per day. 30
Anaesthetic Gas and O2.

CHART 4.—Diabetes mellitus and exophthalmic goitre. Duration of diabetes two months. Admitted with severe acidosis and in an acute state of thyrotoxicosis. Severe case.

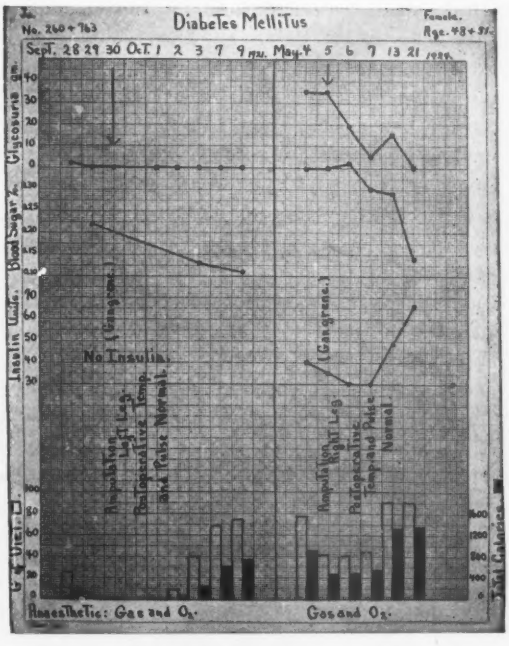
Diabetes Mellitus
Sept. 28 29 30 Oct. 1 2 3 7 9 Nov. May 4 5 6 7 13 21 1924.
Glycosuria gm.
Blood Sugar %.
Insulin Units.
No Insulin.
(Gangrene.)
Amputation Left Leg. Postoperative Temperature and Pulse Normal.
Amputation Right Leg. Postoperative Temperature and Pulse Normal.
Anaesthetic: Gas and O2. Gas and O2.

CHART 5.—Diabetes mellitus and gangrene of an extremity. Two operations—amputation of both legs. Duration of diabetes five years. At the time of the first amputation, September, 1921, diabetic state was mild, while in May, 1924, with the second amputation, it was severe.

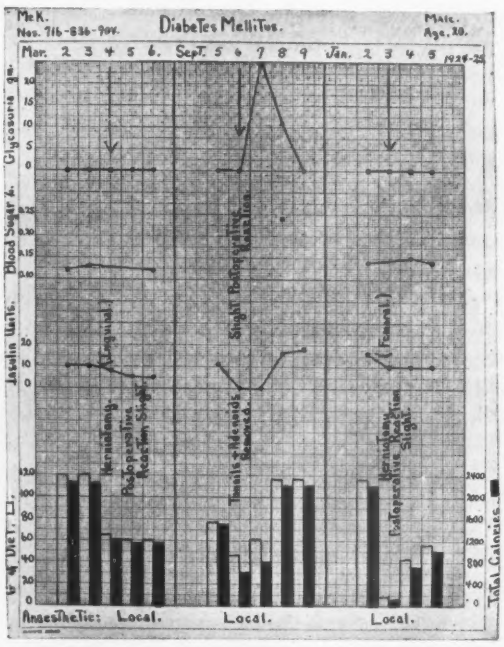
Diabetes Mellitus.
Mar. 2 3 4 5 6. Sept. 5 6 7 8 9 Jan. 2 3 4 5 1924-25
Glycosuria gm.
Blood Sugar %.
Insulin Units.
(Inguinal.)
Herniotomy. Postoperative Reaction Slight.
Slight Postoperative Reaction.
Tonsils & Adenoids Removed.
(Femoral.)
Herniotomy. Postoperative Reaction Slight.
Anaesthetic: Local. Local. Local.

CHART 6.—Diabetes mellitus associated with two herniotomies and removal of tonsils and adenoids. Duration of diabetes two years. Moderate severity.

stant, finally resulting in a raised glucose threshold in the kidneys. Then glycosuria is no longer an index of the degree of hyperglycæmia. Existing with little reserve the day comes when the improperly fitting shoe, infected callus, or carelessly trimmed toenail leads to gangrene.

It is the general opinion to-day that the nature of the arterial alteration in diabetic gangrene is the same as in arterio-sclerotic gangrene. This prevalent opinion is largely due, I think, to the studies of Buerger who in 1915 stated that "In short, characteristic for so-called diabetic gangrene is the presence of the typical lesions of athero- or arterio-sclerosis. These differ in no way from the lesions of the arteries of the arterio-sclerotic in senile gangrene, and justify the conclusion that in diabetic gangrene we are dealing with an athero-sclerotic or arterio-sclerotic process." Studies in this clinic by Dr. Scrimger indicate that this conception is in part incorrect. Upon injecting the arterial system of amputated limbs he has found that the vessels are patent well into the smaller arterioles from which point there is a very marked quantitative reduction in the vascular tree. This peripheral quantitative vascular reduction is much more noticeable in diabetic than in senile gangrene. If such is the case the distinguishing fundamental vascular alteration in diabetic gangrene may be a peripheral capillary and smaller arteriole degeneration.

Prophylactic treatment of diabetic gangrene is more satisfactory than treatment of the actual lesion. Insulin *per se* will not alter the vascular change. By a strict control of the diabetic state, and daily attention to the local condition a great deal can be accomplished and many limbs saved. During the past two years several cases of rather extensive diabetic gangrene have healed completely by medical means. These are, in addition to strictly controlling the diabetic condition, rest, warmth, daily exercise, and general and local exposures of ultra violet light from a quartz-mercury vapour lamp. Since the introduction of the last procedure better results have been obtained. Just what action the ultra violet light has in improving the local circulation of the part is not known.

Conclusions

Judging the diabetic as a whole as a surgical risk I am willing to state that in a clinic well organized for the handling of diabetic cases their mortality should be very little if any above that of the non-diabetic. This of course implies a strict hospital regime, a careful preoperative preparation and a thoughtful postoperative treatment. This state of affairs has been made possible by insulin, one of the greatest medical developments of this age, for which we thank Drs. Banting, Best, Collip, and their associates in the Toronto School of Medicine.

Tailed Children — Amongst the specimens added to the museum of the Royal College of Surgeons of England during the present year is a very good example of a human tail. It was removed by a surgeon from a child a few weeks after birth, and measures fully four inches in length. It is covered by skin, and contains striped muscular fibres embedded in fibrous tissue, but, as is usual in such cases, vertebræ and joints are absent. Such structures represent the persistence of the external tail which projects from the caudal end of every human embryo during the fifth and sixth weeks of development, but which should undergo retrograde changes in the seventh week and disappear in the eighth, the post-anal dimple being the only trace left in normal children. Occasionally retrogression fails, and the tail increases in length and in thickness with the growth of the body, and forms a structure which surgeons are called on to remove from newly born children. In a case recorded by Dr. Ross Harrison, the inventor of the modern technique of tissue culture, the child used its tail as a medium of expression when put to its mother's breast. Human tails containing vertebræ are rare, but the soft vermiform variety are not so uncommon as is usually thought.—*Brit. M. J.*, Oct. 2, 1926.

An Address
ON
DIABETIC GANGRENE*

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IDEAS as to the etiology, diagnosis and treatment of gangrene of the extremities occurring in the course of diabetes are recorded throughout medical literature. Crystallization of such ideas is necessary and accumulation of a large experience makes this possible. From the point of view of physiology, no other disease has been as thoroughly investigated as diabetes. The greater part of the development of our knowledge of the intermediary metabolism of carbohydrates, fat and protein, is the result of the study of this condition, and as Lusk puts it "the work done is prophetic of the possible accomplishments along scientific lines in the study of disease." Accumulation of clinical experience has kept pace with the advances of the laboratory. The knowledge gained has not, however, paralleled that of the latter. This is obviously not due to lack of effort. Collecting, assorting and analyzing clinical data cannot be performed, relatively, with the same ease as collecting, assorting and analyzing laboratory data. The chief difficulty in interpreting clinical experience is the number of variables which may affect phenomena. When, however, a large experience has accumulated, it is possible at times, by modern statistical methods, to draw conclusions from observations. Conclusions drawn from clinical experience may be said to be warranted in direct proportion to the number of observations made.

That gangrene occurring in the course of diabetes is of importance sufficient to warrant it forming the subject matter of a separate investigation is obvious to anyone who compares its frequency, and its large influence on the mortality rate from that disease, with its incidence and influence before the days of insulin.

Since 1921, 1016 patients were observed in the diabetes clinic of the Montreal General Hospital. Thirty-six, or 3.5 per cent of these patients had gangrene. Though this may at first sight appear to be a small percentage, on further analysis it is found that gangrene has become one of the chief contributing causes of death in this disease. This is shown in Table 1. In this table are shown the periods of 1921 to 1925 inclusive, representing 808 diabetics, and thirty-four cases of gangrene. It will be observed that during 1921 and 1922 there were 208 patients admitted to our diabetic clinic. Six of these, or 2.8 per cent had gangrene. The deaths from all causes during these two years numbered twenty-five, or 12 per cent of the total admissions, and four, or 16 per cent, of these deaths were due to gangrene. On the other hand, during the period 1923-24-25, there were 600 patients admitted to the clinic, twenty-eight of which, or 4.6 per cent, had gangrene. During the same period there were twenty-three deaths from all causes, or 3.8 per cent, of the total admissions. Nine of these deaths, or 39 per cent of the total, were due to gangrene. It will thus be seen that though the death rate from diabetes has decreased in our series of hospital treated cases, not only has the incidence of gangrene not decreased, but it has accounted for a very large percentage of the total mortality from this disease. This is due to the fact that other conditions formerly contributing to the death rate, such as surgical complications, coma, etc., are now fairly well controlled with insulin. Thus, it will be noted that in 1922, just before the

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TABLE I

INFLUENCE OF GANGRENE ON THE DEATH RATES FROM DIABETES IN THE MONTREAL GENERAL HOSPITAL BEFORE AND SINCE INSULIN TREATMENT

Year	Number of admissions	Gangrene		Deaths from all causes		Deaths from gangrene	
		No.	Per cent	No.	Per cent of total admissions	No.	Per cent of total deaths
1921	84	2	2.3	9	10.7	2	22.2
1922	124	4	3.2	16	12.9	2	12.5
Total	208	6	2.8	25	12.0	4	16.0
1923	206	13	6.3	11	5.3	4	36.3
1924	174	9	5.1	5	2.9	2	40.0
1925	220	6	2.8	7	3.1	3	42.8
Total	600	28	4.6	23	3.8	9	39.1

advent of insulin, the death rate from all causes was approximately 8 per cent of the total number of diabetics in our clinic, that is sixteen deaths of a total of about 200 cases, whereas in 1925 it had fallen to about 1 per cent, that is, seven deaths in over 700 cases. In view of these observations, it becomes necessary to pay particular attention to this complication of the disease, and attempt if possible, to crystallize our ideas as to its etiology, and the methods of prevention and treatment.

Since I intend drawing conclusions from our observations on 1,000 cases, it is first necessary to demonstrate that they are warranted by the experience having been sufficiently large. Some data of a similar nature, but obtained from a much larger group of cases, are therefore presented. In Table 2 are recorded the results

TABLE II

INCIDENCE OF GANGRENE

	Joslin	M.G.H.
Total number of diabetics	2,800	1,016
Males: Number	1,596	630
Per cent	57	62
Cases of gangrene: Number	84	36
Per cent	3.0	3.5
Males	58	23
Females	26	13
Average age of all cases	61	61.4

of a study of 2,800 cases by Joslin. Our corresponding data are incorporated in the same table for purposes of comparison.

It will be observed that the incidence of gangrene in our clinic was practically the same as that in Joslin's. Of 1,016 diabetics thirty-six, or 3.5 per cent, had gangrene, and of Joslin's 2,800 cases eighty-four, or 3.0 per cent, had this complication . In both clinics the sex incidence of diabetes approximated each other, and about twice as many males as females had gangrene. The average age of all patients with gangrene was, also, practically the same, that is, about sixty-one years. Other similarities will presently be discussed. In view of this similarity of experiences, it appears that conclusions to be drawn from certain observations on our one thousand cases are reasonably warranted.

A detailed study of the relationship between age and gangrene reveals two important facts.

TABLE III

INFLUENCE OF AGE UPON INCIDENCE OF GANGRENE

Age (years)	Total number of diabetics	Number cases of gangrene	Per cent gangrene in total diabetics
–10	13	0	
11–20	37	0	
21–30	79	0	
31–40	117	0	
41–50	280	4	1.4
51–60	315	11	3.5
61–70	157	17	10.8
71–80	17	4	24.7
81–	1	0	

These are demonstrated in Tables 3, 4 and 5. It will be seen, (Table 3) that the incidence of gangrene increases with age. This is a well

TABLE IV

TIME INTERVAL BETWEEN ONSET OF DIABETES AND OCCURRENCE OF GANGRENE

Age at onset of diabetes	*Average time in years for development of gangrene*
30 to 40	9.3
41 to 50	7.3
51 to 60	1.5
61 to 70	1.3
71 and over	0.6

TABLE V

TIME INTERVAL BETWEEN ONSET OF DIABETES AND OCCURRENCE OF GANGRENE

Time interval	*Joslin*		*M.G.H.*	
	No.	*Per cent*	*No.*	*Per cent*
Within 1 year.....	13	15.4*	10	27.7
1 to 4 years.....	16	19.0	20	55.5
5 to 10 "	24	28.6	4	11.1
11 to 20 "	23	27.4	2	5.5
21 and over.....	3	3.5		

* Percentage calculated from total number of cases, *i.e.*, 84.

recognized fact, but its magnitude is hardly appreciated. In our experience about 25 per cent of all diabetics past the age of seventy years developed gangrene. In Joslin's experience one out of every five individuals who developed diabetes above the age of seventy also developed gangrene.

The readiness with which gangrene develops appears to be more related to the period of life at which the diabetes develops than to the duration of the disease itself. In Table 4 are shown the average time intervals between the development of the diabetes and the onset of gangrene in relation to the ages at the onset of the diabetes in our own cases. It will be noted that when the disease developed between the ages of thirty and forty years, the average time before gangrene occurred was 9.3 years, whereas when the disease developed past the age of seventy years, the average time before the gangrene occurred was less than *one* year.

This may also be seen from a different angle. On Table 5 is shown the rapidity with which gangrene set in in relation to the duration of the diabetes. Both Joslin's and our data are recorded. At first sight there appears to be a discrepancy. It will be noted that the great majority of our cases (thirty out of thirty-six) developed gangrene during the first four years of the disease, whereas only about one-third (twenty-nine out of eighty-four) of Joslin's cases developed gangrene in so short a time. The difference lies in the fact that the majority of our patients with gangrene developed diabetes later in life. Though the *mean* ages at which the gangrene developed were the same in both clinics, the *mode* differed, being at an older age in our cases.

This remarkably large incidence of gangrene noted past the age of seventy years, and the short time interval between the onset of diabetes and the occurrence of gangrene at this age presents some difficulties in its interpretation. This is one example of the difficulties one may meet with in the interpretation of clinical data. The experience of both clinics is that between 20 and 25 per cent of all patients who developed diabetes past the age of seventy years and who *applied for treatment*, also developed gangrene. It does not, however, necessarily follow that 20 to 25 per cent of *all* diabetics who develop the disease past the age of seventy years also develop gangrene. Firstly, the selections of both clinics were not strictly of a *random* nature. The great majority of individuals with gangrene tend to come to hospitals. This cannot be said of the majority of diabetics past the age of seventy years with no gangrene. Secondly, exact histories are more difficult to obtain and therefore the duration of the disease is more difficult to estimate in elderly than in young diabetics. Another factor which tends to make the incidence of gangrene smaller, and the time intervals for its onset longer, in the earlier decades, is the relatively larger number of young people seeking treatment. More diabetics are accidentally discovered among young individuals. The date of onset of the disease is therefore more readily established. This particularly applies to diabetics between the ages of thirty and forty-five years, partly due to the frequency with which such individuals apply for life assurance policies. In our series of 1,016 patients, the diabetes was accidentally discovered in 124 cases during the course of examination for life assurance. In spite, however, of the fact that there are many variables which cannot be expressed quantitatively, the fact remains that individuals who develop diabetes when they are

beyond sixty years of age are particularly liable to gangrene.

That the diabetes need not be severe in order to develop this serious complication is recognized clinically, but may be seen from another point of view. (Table 6). In only five of the thirty-six cases of gangrene were both sugar and acetone bodies found in the urines. In twenty-six cases sugar but no acetones were found, and in five cases neither sugar nor acetone bodies were present. Of these five cases, the absence of sugar in the urines could be explained on the basis of a high threshold in two cases.

TABLE VI

INCIDENCE OF GLYCOSURIA AND ACETONURIA IN THIRTY-SIX CASES OF GANGRENE

	No.	*Per cent*
Glycosuria and acetonuria	5	13.9
Glycosuria. No acetonuria	26	72.2
No glycosuria. No acetonuria	5	13.9

A diabetic cannot afford to have syphilis. This is shown in Table 7. Of 301 diabetics with no gangrene, the Wassermann reactions were positive in only twelve cases, or about 4 per cent of the total, whereas of ten tests done on patients with gangrene, two, or 20 per cent, were positive. In other words the incidence of syphilis was five times as great in diabetics with gangrene as in those with no gangrene. Of the fourteen diabetics known to have syphilis, two, or 14 per cent, had gangrene, whereas of 297 diabetics with known negative reactions eight, or only 2.6 per cent, had gangrene.

TABLE VII

DIABETIC GANGRENE AND SYPHILIS

	M.G.H.	*Joslin*
Total number of tests (Wassermann)	311	1,000
Positive reactions:		
Number	14	16
Per cent	4.5	1.6
No gangrene		
Total number of tests	301	972
Positive reactions:		
Number	12	13
Per cent	4.0	1.6
With gangrene		
Total number of tests	10	28
Positive reactions:		
Number	2	3
Per cent	20	11
Diabetics with syphilis	14	16
With gangrene:		
Number	2	3
Per cent	14.3	18.7
Diabetics with no syphilis	297	984
With gangrene:		
Number	8	25
Per cent	2.6	2.6

Joslin states his experience differently, but when his figures are recalculated on a similar basis as ours, the conclusions are practically the same. The comparative data are shown in Table 7. Joslin states that "a positive Wassermann reaction or history of syphilis was about seven times as common among those having gangrene as among 1,000 cases of diabetes." He also states that of 1,000 Wassermann reactions 1.6 per cent were positive, of twenty-eight patients with gangrene three had syphilis, and of the diabetics having syphilis 10 per cent had gangrene. From these data it is seen that since twenty-eight patients with gangrene were tested and since the total number of tests was 1,000, there were 972 patients with no gangrene. Since the incidence of syphilis for the whole group was 1.6 per cent there were sixteen cases of syphilis. Three of these had gangrene. Therefore thirteen patients with syphilis did not have gangrene. In other words of 972 cases with no gangrene thirteen, or 1.4 per cent, had syphilis, but of twenty-eight cases with gangrene three, or 11 per cent had syphilis. Of the sixteen diabetics with syphilis three or 18.7 per cent had gangrene, whereas of the 984 cases with no syphilis only twenty-five or only about 2.5 per cent had gangrene.

Here again is an example of the difficulties met with in interpreting clinical data. It would appear that in diabetes the incidence of gangrene is about five to seven times as great in syphilitics as in non-syphilitics. This statement however, requires qualification. There are many variables to consider, and the number of observations is so small that the rates found could very easily be disturbed. The findings are however very suggestive since

the incidence of syphilis amongst a group of diabetics selected at random is no greater than that of the non-diabetic population and these individuals consulted these clinics not for syphilis but for diabetes.

One of our internists (Dr. C. C. Birchard) made the interesting suggestion that the large incidence of positive Wassermann reactions found in our cases of diabetes with gangrene may have been due to the high lipoid content of the blood found in these cases. This was worth investigating in view of the generally recognized fact that the addition of cholesterol to the reacting mixture increases the sensitivity of the Wassermann reaction. It will be noted in Table 8, that in the cases of gangrene observed, the two greatest cholesterol percentages were 0.501 and 0.561 per cent. In both of these cases, the Wassermann reactions were negative, and on investigating all our cholesterol data, obtained as a routine, we found that the greatest number of the positive reactions were not found in the patients with the excessive blood cholesterols; in fact, only one of the twelve positive reactions in the cases of diabetes with no gangrene was found associated with an excessive cholesterol, namely, 0.421 per cent.

TABLE VIII

RELATIONSHIP BETWEEN WHOLE BLOOD SUGAR, PLASMA CHOLESTEROL, URINARY SUGAR AND ACETONE BODIES

Hosp. No.	*Blood sugar*	*Plasma cholesterol*	*Urinary sugar*	*Urinary acetone bodies*
146–24....	0.217	0.268	+	0
886–	0.232	0.501	+	+
1610–	0.312	0.333	0	0
2773–	0.212	0.471	+	+
2333–	0.147	0.299	0	0
3765–	0.169	0.316	0	0
2886–	0.285	0.421	+	0
3722–	0.145	0.385	+	0
1273–	0.208	0.316	+	0
1506–25....	0.250	0.222	+	0
1104–	0.277	0.312	+	0
3947–	0.175	0.341	0	0
5794–	0.400	0.561	+	+
350–26....	0.217	0.241	+	0
831–	0.222	0.190	0	0
5231–	0.400	0.326	+	0
Average....	0.242	0.344		

The subject of syphilis has been discussed somewhat at length in order to emphasize the importance of the Wassermann reaction as a routine in all cases of diabetes. Its disclosures may be of value not only in the prophylaxis and treatment of gangrene, but also in the correct interpretation of slow healing of wounds following amputations. In this connection the following case is illustrative:

A woman (Hosp. No. 5231-26) fifty-eight years of age, was admitted into the medical service of Dr. A. H. Gordon on October 18, 1926. On admission the great toe of the right foot was completely involved in a gangrenous process. There appeared to be a fairly defined line of demarcation, but there was a slight cellulitis of the dorsum of the foot. On the lower parts of both legs, there were several scars and also diffuse pigmentation of the skin. The temperature, pulse and respirations were normal. The urine contained sugar but no acetone bodies and the fasting blood sugar was 0.238 per cent. The Wassermann reaction was later reported as +++.

The patient was kept in bed, and alcohol dressings were applied to the affected part. With proper diet and insulin treatment, the urine was rendered sugar free in twenty-four hours, and the blood sugar approached the normal level. For a short time the condition appeared to be controlled. The line of demarcation between healthy and diseased tissue became more marked.

In spite of the diabetes being under control a slight thermal reaction was noted on October 26th, and the cellulitis on the dorsum of the foot became more marked. On November 1st Dr. E. M. Eberts was called into consultation. His opinion was that operation could be safely postponed, and he suggested intensive anti-luetic treatment to ensure healing of the post-operative wound. Within one week of the institution of anti-luetic treatment the cellulitis practically disappeared and the line of demarcation became well defined.

It is obvious that had the Wassermann reaction not been obtained as a routine in our medical wards, the pigmentation and scarring of the skin of the legs would have aroused suspicion. Without the routine, however, and in the absence of the skin condition, the delayed healing of the post-operative wound in this case, would in all probability, have been attributed to the diabetes.

As to the relationship between dietary indiscretion and incidence of gangrene, I believe we have very suggestive data. Since the institution of the diabetes clinic in our hospital, the principle of undernutrition has been rigidly adhered to. If the disease is found to have passed the stage of transient or post-prandial glycosuria, the patients, with very few exceptions, receive only between 50 and 75 grams of carbohydrates per day. This also applies to insulin treated patients. We continually stress the point that diabetics may have no food nor insulin beyond that required for maintaining the standard height-weight relationship. It may be the result of the operation of the laws of chance, but of the thirty-six patients with gangrene in our clinic, only four were our own cases at the onset

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of this condition, the remaining thirty-two having come to us with the gangrene. On the basis of probabilities however, it is very unlikely that chance would consistently operate in one direction over a period of five years in such a fairly large series of cases.

The results of our studies of the cholesterol content of the plasma in these cases appear to be suggestive. Cholesterol determinations were made in sixteen patients with gangrene. These with their corresponding blood sugars are recorded in Table 8. It will be observed that the average value of all the cases was 0.344 per cent. Only two of the sixteen patients with gangrene had normal amounts of cholesterol in the blood. A better picture is obtained by calculating the average cholesterol percentages in the different types of case. In Table 9 are reproduced the

TABLE IX

PLASMA CHOLESTEROL IN DIABETES

Subject	*Cholesterol (per cent)*
*Normal	0.23
*Mild diabetic	0.26
*Moderate "	0.30
*Severe "	0.50
Gangrene with:	
**Mild diabetes	0.30
**Moderate "	0.33
**Severe "	0.56

*Joslin, Bloor and Gray.
**Our own data.

cholesterol values recorded by Joslin, Bloor and Gray for normal and diabetic individuals. Our data on gangrene are incorporated for comparative purposes. It will be noted that though the cholesterol content of the blood is increased in diabetes, the average percentages found in diabetes with gangrene are of a still greater magnitude.

What is the significance of these findings? Allen has demonstrated that over-feeding is the chief cause of impairment of pancreatic function. The degree of impairment of pancreatic function and prognosis are, obviously, intimately related. Joslin, Bloor and Gray have demonstrated a relationship between the lipoid content of the blood and prognosis, and also the fact that changes in the cholesterol content of plasma are reliable indices of changes in blood lipoids. It is rather difficult to accurately separate the patients who are following their diets rigidly from those who are not, but, in the average, it appears that the best behaved patients have the lower cholesterol values. Dietary indiscretions result in high blood cholesterols. Patients with gengrene have high cholesterols. The association is suggestive, especially in view of the recent observations by Root and Warren of the influence of blood lipoids, particularly cholesterol, upon vascular disease.

Whether diabetic gangrene is nothing more than an expression of senility is, I believe, still problematic. Buerger's findings in 1915 justified the conclusion, *on an anatomical basis*, that in diabetic gangrene we are dealing with an arterio-sclerotic process which cannot be differentiated from the senile form of this condition. No advances of a fundamental nature have since been made in the pathology of the two forms of gangrene. The explanation generally offered for the relatively early appearance of gangrene in diabetes is that because of the altered metabolism the diabetic is older than his stated age. This view is particularly strengthened by the fact that rarely does one see a diabetic with the disease of ten years duration or more without some arterio-sclerotic changes. There are, however, certain differences to be noted between the two forms of gangrene.

Firstly, the incidence of this form of gangrene appears to be much greater than the senile form. Our youngest diabetic with gangrene was forty-five years of age. Let us assume that, because of the disturbed metabolism the diabetic is twenty-five years older than his stated age. This is allowing a very wide margin. We are therefore assuming that all our diabetics past the age of forty-five were seventy years old or over. Of 385 such diabetics admitted to the Montreal General Hospital thirty-six or 9.3 per cent had gangrene. Of 756 non-diabetics of seventy years of age or over admitted during the same period, there were only seven cases of gangrene. The incidence of gangrene found in the diabetic group was therefore about ten times as great as that found in the non-diabetic group, during the same period of time.

Another feature is the particular susceptibility to gangrene when the diabetes is developed past the age of seventy years, that

is, when the individual shows some arterio-sclerotic changes. This is striking. It would appear that in diabetes we have an agent with a particularly destructive action on the blood vessels. We know that upon the arterio-sclerosis accompanying old age many other conditions which, by themselves, may cause arterial degeneration, may be superimposed and the chances of the appearance of gangrene are relatively slight. These include syphilis, lead poisoning, renal disease, etc. On the basis of the process in diabetes being the same as in senility it is rather difficult to imagine that diabetes would so rapidly age the individual with arterio-sclerosis as to hasten the *same* process to the stage of gangrene within one or two years. This is suggested in view of the mild form of diabetes usually found in these people. As shown before, of the thirty-six patients with gangrene five were very mild and in twenty-six cases the disease was only moderately advanced.

Our data on blood cholesterols also suggest two different forms of gangrene. Both in senile arterio-sclerosis and diabetes the concentration of cholesterol in the blood is increased, but there are marked differences in the average values. Since we have made sixteen cholesterol determinations in cases of gangrene occurring in the course of diabetes, an equal number of analyses were made on non-diabetic arterio-sclerotics past the age of seventy years. These were selected at random. The average percentage of cholesterol in this group was 0.249 per cent, whereas, as noted above, the average of the diabetics with gangrene was 0.344 per cent. Only two of the sixteen diabetics with gangrene had normal cholesterols, whereas six of the non-diabetic arterio-sclerotics showed normal values.

There appear to be some anatomical differences. In the experience of Dr. Connor, the type of arterio-sclerosis usually found in the diabetic with gangrene is that of the Mönckeberg type, in which the media of the vessel is first to show the lesion. This type is rarely found in non-diabetics. It is interesting to note that, when it does occur in non-diabetics, it is usually found, as in diabetics, in younger subjects than the more common intimal type of arterio-sclerosis. The lesion usually consists of a progressive fatty degeneration and fibrosis of the media followed by the deposition of calcium salts and sometimes the formation of new bone. Only later does the intima become involved, becoming greatly thickened and the line of demarcation between intima and media is lost. With intimal injury thrombosis occurs and partly organized or canalized thrombi are almost always present by the time gangrene has taken place.

As to symptoms, the commonest were pain, coldness and numbness, prior to the onset of the gangrene. In compiling our data, these complaints were considered only when referred to one limb or one particular part of one limb. The maximum, minimum and average time intervals between the development of these signs and the onset of gangrene were calculated. The combined data are briefly recorded in Table 10. Pain was the commonest com-

TABLE X

TIME INTERVAL BETWEEN ONSET OF SYMPTOMS AND OCCURRENCE OF GANGRENE

	Time interval		
Symptom	*Maximum*	*Minimum*	*Average*
Coldness.....	2½ years	4 months	11 months
Numbness.....	11 months	3 weeks	6½ months
Pain.....	5 months	2 weeks	3½ months

plaint, but not the earliest. The maximum time interval between its appearance and the onset of gangrene was five months, the minimum two weeks, and the average three and one-half months. The maximum, minimum and average time intervals for "numbness" were eleven months, three weeks and six and one-half months respectively, and for "coldness" these were two and one-half years, four months and eleven months respectively. In five cases there were none of these signs. The first evidence of gangrene in three of these patients was a red or black spot and in the other two cases blisters were first noted. The series of observations is small, but the findings are mentioned in order that they may be tested by other workers.

While on the subject of pain a digression may not be out of place to emphasize the similarity between symptoms of sciatica and early gan-

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grene. Diabetics, as is well known, are very liable to sciatica. Pain extending to the toes, coming on suddenly, and at times causing limping should arouse suspicion, and not be dismissed with the term "sciatica" or diabetic neuritis, and the suggestion to the patient that if the diet is followed the pain will probably disappear. Special inquiry should be made as to whether attacks of pallor or bluish red discolouration occur in the same limb. These attacks suggest gangrene, especially if on examination the foot is sometimes found to be pale and cold and at other times congested. The diagnosis of early gangrene is reasonable if the pulse in the posterior tibial artery is obliterated and is almost certain in the absence of pulsation in the popliteal artery. X-ray examination is of value here.

The incidence of gangrene on the left foot was sufficiently greater than that on the right to seek for a possible explanation. One of our surgeons suggested the possibility of a vascular difference—that the right foot probably had a better circulation than the left. May it not be due to the fact that since the greater majority of people are right-handed, the left foot is more accessible? This is suggested in view of our finding that paring of corns, bruising and tearing of toe-nails preceded the gangrene in twenty of the thirty-six cases.

Unlike the ætiology, ideas as to treatment are fairly well crystallized. The subject may be considered under three headings, (a) prevention, (b) treatment of very early gangrene, when the tissues are fairly well supplied with blood and the skin surface is intact and (c) treatment of late gangrene.

The prevention and treatment of very early gangrene is entirely within the domain of the internist. It is, however, because treatment of late gangrene is attempted by those not qualified, that, as Joslin puts it, the surgeon often receives, but seldom deserves, the blame of a fatal issue.*

The treatment of early gangrene (when the only findings are redness, pallor, a slight cyanosis, a feeling of numbness or cold or pain) has been so varied and the number is so small that a proper evaluation of any one procedure is hardly possible. Rest with dietary and insulin treatment, Buerger's exercise, hot and cold baths alternately, radio-therapy and decortication of blood vessels have all been tried with strikingly good results but also with failures. Joslin whose experience has been much greater is rather impressed with the value of Buerger's exercise. The principle of this form of treatment is certainly sound. These cases require constant watching since as Buerger points out "destruction, disintegration and infection of the deeper tissues, muscles, tendons, and even bone (may be) masked by the superficial parts to such a degree, that often only considerable experience and very careful observation will succeed in giving the observer a proper estimate of the degree of necrosis present."

Ideas as to treatment of gangrene beyond the stage of recovery of the affected part are probably more crystallized. The cases may generally be divided into those which unquestionably demand immediate operation and those in which delay may be possible. For the typically foul and infected case with septicæmia immediate removal of the limb appears to be the only course open. This type of patient, as soon as he seeks advice belongs to the surgeon. The only part the internist may play here is in the control of the diabetes immediately preceding, during and after the operation.

It is the other type of case that presents the greater problem. Though amputation of the limb is the eventual form of treatment, this may be postponed, if other conditions which tend to increase the surgical risk are also present. Proper dietary measures and insulin treatment before operation may do much to favour the post-operative course, particularly the resistance of the tissues to infection and the process of healing. A most important consideration here, however, is the influence of the gangrene on the progress of the diabetes. If in spite of the local condition, the urine can be kept sugar free and the blood sugar normal, the operation may safely be postponed until the surgeon feels the risk has been minimized. If, however, the diabetes cannot be controlled immediate operation is the best course. It should be recalled that *elderly diabetics do not*

* The Diabetic Clinic of the Montreal General Hospital issues a leaflet to all its patients, giving in clear and simple language the elementary precautions to be observed by diabetics as regards the prevention of gangrene.

react to insulin treatment as readily as do younger subjects. Superimposed upon this, there is the gangrene which by itself tends to neutralize the effects of insulin. Once the gangrenous limb is infected this adds greatly to the difficulties and enormous doses of insulin may have no effect whatever. The patient then dies in diabetic coma as in the days before insulin. We have had two such deaths.

As to the ideal site for amputation, this is purely a surgical matter. When, however, one is in the fortunate position to see the combined experiences of all the surgeons, one may venture to state the impressions gained. Unfortunately, in studying the literature on this subject, very few conclusions can be drawn. The many possible variables to consider in the interpretation of the results, though they may have been considered, have not been recorded. This is another example of the necessity of statistical methods in medicine. Among the important variables are (a) the presence or absence of infection, (b) the anæsthetics employed and the duration of each, (c) the nature of the diet, (d) the availability of insulin, (e) the effectiveness of the insulin administered in controlling the blood sugar, (f) other contributing factors such as age, the condition of the heart, kidneys, etc., and (g) the proximity of the site of amputation to the site of the gangrene.

Though the results of this study cannot for these reasons be expressed quantitatively, the impression is that the most favourable results were obtained by amputation just below the knee. The mortality following amputation at the ankle appears to have been the same as that following amputation above the knee. Removal of one toe or part of one toe in the majority of cases demanded a second operation. Disarticulation at the knee joint appears to have been exceptionally fatal, and of the surviving subjects it appears that a great number required a second amputation higher up.

These observations represent our experience. The fact that certain of these agree with those of another clinic representing almost three times the number of cases appears to make it probable that one thousand diabetics is a reasonable number from which to draw conclusions. It is obvious, however, that with a much greater number the conclusions drawn would more closely approximate the truth. Since gangrene, even under modern conditions represents one of the chief causes of death in diabetes, it appears that this should be a sufficient incentive for a greater study of these cases.

Importation of Useful Parasites.—Ever since Hawaii saved millions for the cane plantations by introducing parasites to prey on the sugar cane leafhopper, the importation of beneficial insects has gone on apace. A tiny parasite sent over from Mexico, according to O. H. Swezey at the Experiment Station of the Hawaiian Sugar Planters Association, has become an efficient check on the activities of a mealy bug that prefers the plutocratic diet of avocados. An Australian parasite has been of great aid in rescuing the native ferns from extermination at the hands or rather the mandibles of a foreign weevil that had increased in the islands in great numbers. Still other parasites from various countries have helped prevent outbursts of army worms that have flared up in hordes from time to time in the past. Introduced fig wasps, states Mr. Swezey, help fertilize wild fig trees that have been planted as part of a forestry project to improve the water-sheds in mountains where the natural forests are on the decline. Insect power is being further harnessed for the benefit of man in an attempt to weed out a troublesome species of grass with a stem borer from the Philippines. The borer was first held under observation in its native habitat before it was allowed to be brought in, and then grown in quarantine after arrival. Since the insect developed no desire to eat valuable food plants it was turned loose, but has not yet been out long enough to prove definitely its value as a weed exterminator. — *Science Supplement,* Dec. 3, 1926.

There are five good principles of action to be adopted: To benefit others without being lavish; to encourage labour without being harsh; to add to your resources without being covetous; to be dignified without being supercilious; and to inspire respect without being austere.—Confucius, quoted in *Clinical Medicine.*

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THE PHYSIOLOGICAL FACTORS DETERMINING THE ACIDITY OF THE GASTRIC JUICE AND OF THE GASTRIC CONTENTS*

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THE judgment concerning the activity of the gastric glands in man is, in a great degree, based on the results of the determination of the acidity of the gastric contents obtained after a certain test-meal. There are, however, several physiological factors which influence the acidity of the gastric contents. Before a conclusion is drawn from the clinical findings a participation of different factors influencing the acidity of the gastric juice and the subsequent neutralization of the gastric acid should be considered. In the following lines an attempt is made to systematize our knowledge concerning the physiological factors affecting the acidity of the gastric contents as well as of the gastric juice itself.

If we exclude the acid which may be ingested with the foodstuffs, or formed from them in the course of gastric digestion, the acidity of the gastric content is chiefly due to the HCl of the gastric juice. The average acidity of a pure gastric juice in man and dog is 0.5 p.c. HCl. The average acidity of the gastric contents is equal to 0.2 p.c. HCl. What factors are responsible for this lowering of the original acidity of the gastric juice?

1. *Action of saliva and foodstuffs.*—The saliva, swallowed with the foodstuffs, has a definite neutralizing power, which is similar to the buffer action of the blood (Marshall[1]). Besides this the protein constituents of the saliva have the property of binding the acids (Smirnitskaia[2]). The proteins of the foodstuffs, acting as bases, have the power to combine with the hydrochloric acid of the gastric juice, thus forming combined hydrochloric acid, which in reality is a protein salt of the hydrochloric acid. The ionization of this salt is different from that of the free acid. Besides this, certain chemical compounds of the food may neutralize the HCl of the gastric juice with formation of neutral salts (chiefly sodium chloride). The neutralization of the gastric acid by the food masses, etc., is seen from the following experiments of Kahn and Yaure.[3] The hydrogen ion concentration was determined in the pure gastric juice of Pavlov's pouch and in the gastric contents in the main stomach of a dog after a meal. The hydrogen ion concentration of the gastric juice from the Pavlov's pouch during- the whole secretory period remained constant and was equal to $p^H=1.1$. The hydrogen ion concentration of the contents of the main stomach began to rise fifteen minutes after the meal and in sixty minutes reached its maximum (from $p^H=2.5$ to $p^H=1.65$). Then it fell gradually and in 240 to 250 min. returned to the initial, or even a lower, level.

2. *Influence of gastric mucus.*—The surface epithelium of gastric mucous membrane secretes mucus containing typical mucin. The reaction of gastric mucus to litmus is alkaline, and mucin belongs to the class of mucoproteins. Therefore, the HCl of the gastric juice may be neutralized and combined with mucin. There are many evidences that the contact of gastric juice with the gastric mucous membrane diminishes its acidity. The slower the secretion of the gastric juice the more is its acid neutralized by the mucus, and vice versa (Ketcher[4]). Moreover, it seems that the secretion of mucus is influenced by the presence of food masses in the stomach. In man, Aldor[5] and Schütz[6] found usually, in a fasting stomach, only a scanty quantity of mucus. During digestion the gastric contents were always mixed with a significant amount of mucus. Certain kinds of food seem to stimulate especially strongly the production of the mucus. Thus Pavlov[7] has seen, in a dog, that the gastric juice secreted on a bread diet contained more mucus than that secreted after a meat or milk

* Read before Halifax Branch Medical Society of Nova Scotia, April 14, 1926.

diet. The acidity of the first kind of gastric juice was lower than that of either of the others. All these data indicate that the acid of gastric juice may, to a certain degree, be neutralized by the mucus in the course of gastric digestion, although this factor does not play a very great part.

3. *Regurgitation of duodenal juices into the stomach during normal digestion.*—Boldyreff[8] was one of the first who showed that during fat digestion, and in case of the presence of a large amount of gastric juice or hydrochloric acid in corresponding concentration in the stomach, the duodenal juice—pancreatic juice, bile, succus entericus, Brunner's juice— regurgitate into the stomach. In the case of fat, pancreatic juice and bile digest it in the gastric cavity. The acidity of the gastric juice is diminished by influx of alkaline juices into the stomach until it reaches 0.15 to 0.2 p.c. This last phenomenon is of very great importance, because only 0.1 p.c. HCl will produce a normal physiological stimulation of the mucous membrane of the duodenum. More concentrated solutions of acid evoke a pathological condition of the intestinal mucous membrane (Kaznelson[9]). Therefore, this lowering of the acidity of the stomach contents by the regurgitation of alkaline juices is a self protection of the intestine against excessive and noxious chemical stimulation. The analysis of this phenomenon showed to Boldyreff and his co-workers that the main factor in neutralization of acid solutions in the stomach is the regurgitation of alkaline duodenal juices into the stomach. Neither the saliva (experiments on dogs with œsophagotomy and gastric fistula), nor the mucus of the gastric mucous membrane (experiments with separation of the stomach from duodenum) play a significant part in this neutralization. The most important rôle must be ascribed to the pancreatic juice. Ligaturing the pancreatic ducts in a dog greatly inhibits the discharge of acid solution from the stomach in the duodenum. On the other hand, tying the common bile duct causes very little change in the course of the phenomenon. On the basis of these and other observations, Boldyreff builds a theory according to which the regurgitation by antiperistalsis of duodenal juices into the stomach is a phenomenon which occurs during normal digestion. Scores of other investigators have fully confirmed this view. I quote here only a few recent studies concerning this problem and dealing with human subjects. The fractional analysis of the gastric contents allowed Spencer, Meyer, Rehfuss and Hawk[10] to follow in man, after a test-meal, during several hours, the curve of the free and total acidity and trypsin concentration of the gastric contents. They could establish in general that the high value of trypsin coincides with the low acidity of the gastric contents. On the other hand, the tryptic power of the gastric contents is low when its acidity is high. This work established the dependence of the acidity of the gastric contents in man upon the presence of pancreatic juice in the stomach. Therefore *a low acidity of the gastric contents after a test-meal does not necessarily indicate slow secretion of gastric juice,* because the acid may be partly neutralized by the alkaline duodenal juices.

To get a right idea of the amount of juice secreted one must, according to Bolton,[11] estimate the percentage of total chlorides in the gastric contents. The total chlorides are made up from Cl of the free HCl + protein HCl (*i.e.*, combined with protein HCl in normal subjects) + inorganic chlorides, and this will represent as nearly as possible the percentage of total HCl secreted. The normal curve of the free HCl and the total acidity after a standard test-meal (the so-called *isosecretory curve*) rise gradually to a maximum (in fifty to sixty minutes), form a single peak, and then gradually drop again. But the real secretory curve, according to Bolton, is the curve of total chlorides. Its course is different from that of the curve of active HCl especially at the end of the secretory period, when it remains at its high level as the stomach empties. This discrepancy in the course of the two curves is easily explained if we consider the course of the third curve—of the inorganic chloride; as the acid curve descends the inorganic chloride curve rises and the two cross one another. According to Bolton, the sodium chloride curve represents the curve of neutralization; because the hydrochloric acid of gastric juice is neutralized by the alkaline duodenal juices with formation of sodium chloride.

By the mechanism of self-regulation of the acidity of the stomach, Bolton explains certain cases of hyper- and hypo-acidity which have

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nothing to do with the function of the gastric glands themselves. Already in quite normal individuals the degree of neutralization of gastric contents may vary within certain limits. The secretion of gastric juice in an individual may be perfectly normal, but there may be a deficiency in the neutralizing process which regulates the acidity of the gastric contents. If the regurgitation of duodenal juices is not sufficient, the acidity of the gastric contents is above 0.2 p.c. HCl. The HCl curve keeps climbing while the curve of inorganic chlorides remains low during the whole period of digestion. In case of excessive regurgitation, the neutralization of the gastric juice is excessive, the free HCl is absent, and the curve of inorganic chlorides is higher than the curve of the acidity. The cause of these pathological conditions is the abnormal functioning of the pylorus, which regulates the emptying of the stomach and the inflow of duodenal juices into it. The hypertension of the pylorus may be responsible for the hyperacidity of the gastric contents; its hypotension or the atonicity of the whole stomach allow an excessive neutralization which results in a hyperacidity.

4. *Variations of the acidity of the gastric juice.*—In the last few years evidence has accumulated that the gastric juice may be secreted by the gastric glands with different grades of acidity. This idea is contradictory to the long accepted theory of Heidenhain[12] and Pavlov,[13] according to which the gastric glands always elaborate juice with the same percentage of hydrochloric acid in it. Differences in the acidity of the juice collected from a gastric fistula, or by means of a gastric tube, were explained by varying degrees of neutralization of the acid by the gastric mucus, saliva, duodenal juices, food-masses, etc. Still the facts speak in favour of the new supposition.

Pavlov's theory was based on the observation, that, in a dog secreting pure gastric juice from an empty stomach (dog with œsophagotomy and gastric fistula, Pavlov's pouch dog, etc.) there is a direct relation between the rate of secretion of the juice and its acidity. The more rapid the secretion of the gastric juice, *i.e.*, the less time the juice stays in contact with mucous membrane, producing an alkaline mucus, the higher is its acidity and vice versa. But, there are indications that this direct relation between the acidity of gastric juice and the rate of its secretion is observed only when the gastric glands are secreting under one and the same stimulus. As soon as a new stimulus is introduced (Savich[14]), or the strength of the stimulus is changed (in the late hours of the digestive period—Foster and Lambert,[15] at the end of a sham-feeding—Rosemann[16]) the acidity of the gastric juice may change independently of the rate of its secretion. The data concerning the production of gastric juice in man with different grades of acidity may be found by referring to Carlson,[17] Heyer,[18] Loeper and Bauman[19] and others.

The key for understanding this peculiar relation is probably as follows: The usual division of the cells of the gastric glands (fundus) into peptic or chief cells and oxyntic cells does not correspond to the real conditions. There is a third kind of cells which are neither true mucus cells nor peptic cells, and which are called by Ashoff[20] "intermediate cells" ("Zwischenzellen"), by Zimmerman[21] "Nebenzellen", and by others "mucoid" cells (see Lim[22]). Their staining reactions are quite different from those of the peptic cells. These cells may be found in the glands of the fundus between the peptic cells. The nearer to the pylorus, the greater is the relative number of these cells. According to Aschoff the glands formed by "intermediate" cells and oxyntic cells form the "intermediate zone" of the gastric mucous membrane in the region of the vestibulum, between the fundus and pyloric parts of the stomach. Are the "mucoid" or "intermediate" cells independent secretory elements of gastric glands, or do they only represent a stage in the genesis of the peptic cells, as Lim[22] supposes? One can hardly say.

Certain physiological data may be explained by the presence in the gastric glands of three kinds of secreting cells: peptic, mucoid and oxyntic cells. Long ago, in Pavlov's laboratory, Oushakov[23] when proving the secretory influence of the vagus upon the gastric glands, could see that stimulation of the nerve by the induced current produces a secretion with a very long after effect. If the nerve is stimulated during the continuance of this after effect, the flow of gastric juice is increased but its acidity falls. The juice thus obtained has the physical properties of a mucus (it is viscid). But this

mucus, rich in pepsin, is not identical with the mucus secreted by the surface epithelium of the stomach. It is Oushakov's supposition that, besides secretory fibres for the peptic glands, the vagus contains some fibres which excite the production of this peculiar "mucus". The origin of this mucoid fluid was not clear to Oushakov. Later on, Savich[14] showed that a sham-feeding of a dog with sand, after œsophagotomy and the production of a gastric fistula, provokes the secretion of alkaline fluid from the stomach containing, of course, also the true mucus. Therefore Oushakov's theory about the presence in the vagus nerve of special nerve fibres governing the secretion of mucoid fluid seems to be confirmed.

The secretion by the gastric glands of acid juice and of " mucous fluid" may proceed to a certain degree independently of one another. Especially sharply can this divergence of the two functions be seen under the influence of different drugs. Thus alcohol excites in the dog predominantly the secretion of the acid parts of the juice (Zawrieff[24]); pilocarpine, on the other hand, stimulates chiefly the production of the "mucous fluid" (Chouriloff[25]), (Zitovich[26]). There is also a divergence under the influence of drugs in the function of pepsin-producing cells and oxyntic cells, as Keeton, Luckhardt and Koch[27] have demonstrated by the administration, in the dog, of very small doses of atropin. It is important also to note, that pilocarpine in humans delays the emptying of the stomach, increases the secretion of gastric juice, with low acidity and great amount of mucus. The regurgitation of duodenal juices into the stomach is not augmented (Kalk[28]). All these physiological data support the histological findings. There are probably in the stomach gastric glands containing three kinds of secretory cells: peptic, "mucoid" and oxyntic. The innervation of these cells seems to be affected independently in each type of cell.

As we know, one kind of food, namely bread, provokes a secretion of gastric juice with a lower acidity than does meat or milk. Pavlov explained this by greater secretion of the true mucus, which partly neutralized the HCl of the juice. But quite legitimate would be the question: do different foodstuffs in one and the same degree stimulate all three kinds of the gastric secretory elements, or could not bread provoke a greater activity of the "mucoid" cells as compared with meat and milk? This problem awaits special investigation.

From the practical point of view, this conclusion is not without interest. It draws our attention to the estimation of the value of different test-meals. Usually test-meals containing carbohydrates (tea and bread, oatmeal) are used. It may be that this sort of food excites a secretion of gastric juice with comparatively low acidity. And one must not forget that the judgment about the function of the gastric glands is usually based upon the presence, or the absence, or the degree of acidity of the gastric contents.

5. *Rosemann's theory of distribution of Cl between the HCl and the chlorides of the gastric juice.*—Speaking about the production of gastric juice of different degrees of acidity, we have formed a supposition that the gastric glands, *i.e.*, the oxyntic cells, are elaborating the hydrochloric acid always in one and the same concentration. This acid may be neutralized more or less by the alkaline secretion of other glandular elements in the lumen of the gland itself. Thus a juice with different acidity is secreted. The explanation, however, seems to be still more complicated. Rosemann[29] could see that the total Cl content of the pure gastric juice of the dog is very constant. The oscillations of the Cl content are very limited and do not exceed 6 per cent. Thus, *e.g.*:

1st exp.—
0.5818 to 0.6181 p.c. total Cl content of the gastric juice
2nd exp.—
0.6060 to 0.6424 p.c. total Cl content of the gastric juice

On the other hand, the variations in the Cl content of the gastric juice in the form of HCl and of Cl between the HCl and other compounds (NaCl, KCl, NH_4Cl) always occurs in opposite directions, *i.e.*, the more Cl there is in the form of HCl, the less there is in the form of other inorganic combinations.

The average figures for distribution of Cl in different compounds in the gastric juice are, after Rosemann, as follows:

Acidity in p.c. HCl	Cl in HCl in p.c.	Cl in Ash in p.c.	Cl in NH_4Cl in p.c.	Total Cl in p.c.
0.5472	0.5322	0.0653	0.0162	0.6137

Rosemann performed his experiments on dogs with œsophagotomy and gastric fistula. In a number of cases he could see that there may be

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a divergence between the rate of secretion of gastric juice and the relative content of Cl in the form of HCl and in other compounds. Usually in the third hour of the secretory period, *i.e.*, towards the end of the experiment, there was an increase in the juice of Cl contents in the form of chlorides with corresponding diminution of Cl in form of HCl, the total amount of Cl being approximately the same. In some cases the secretion of juice in the third hour was slower than before and the "neutralizing factor" could play a certain part in this distribution of Cl. But there are cases in Rosemann's experiments which cannot be explained by the neutralization of HCl of the juice by the gastric mucus. As an example I quote the following experiment of Rosemann.

Exp. 12

Hour of secretion	Amount of juice in Cl	Acidity in p.c. HCl	Cl in HCl p.c.	Cl in other combinations p.c.	Total Cl p.c.
First	410	0.5950	0.5787	0.0515	0.6302
Second	280	0.6023	0.5858	0.0394	0.6252

In Experiment 12, the secretion greatly diminished; the percentage of total Cl remained almost unchanged; the Cl in HCl rose; Cl in the ash fell. Rosemann supposes that there are two processes connected with the formation of HCl by the gastric mucous membrane: (1) accumulation of Cl in the mucous membrane of the stomach, and (2) formation of hydrochloric acid. The amount of HCl formed from the Cl storages of the mucous membrane depends on the strength of the stimulus. The stronger the stimulus the more Cl is secreted by the gastric glands in the form of HCl, and the less in the form of chlorides. According to Rosemann[30] there cannot be hyperacidity, but there may be hypoacidity or anacidity of the gastric juice, because the glands may elaborate a juice containing less Cl in the form of HCl than normal. The subsequent neutralization of the acid by the mucus of the surface epithelium plays an unimportant part.

Collip's[31] ingenious study on the formation of hydrochloric acid in the gastric tubules, performed with microchemical methods, supports in certain points Rosemann's theory. Although in both peptic and oxyntic cells of a resting mammalian stomach chlorides are present in traces only, the interstitial tissue is very rich in these salts. A heavy condensation of such salts is seen also about the gland tubes. During the secretory activity the peptic cells are still quite free from chlorides. On the other hand the oxyntic cells and the canals connecting these cells with the lumen in each tubule are extraordinarily rich in chlorides.

Two remarks must be made in connection with Rosemann's theory. Although the variations of distribution of Cl between HCl and chlorides are not very marked in normal conditions, they may be greatly accentuated in pathological cases. The second remark concerns Bolton's[11] thesis: "The curve of total chlorides is the real secretory curve as nearly as can be obtained." Of course, this is true, but according to Rosemann there may be instances in which a great part of Cl will be secreted in the form of chlorides and not in the form of HCl. The prevalence of chlorides over the hydrochloric acid in the juice will be due not to excessive regurgitation of duodenal juices, but to abnormal functioning of the gastric glands themselves.

6. *Influence of water and chloride content of the body on the gastric secretion.*—The last point which has to be briefly mentioned in connection with the secretion of gastric juice is the influence of water and the chlorides content of the body on the work of the gastric glands. This influence is clearly shown by the following experiment of Pavlov.[32] A dog with œsophagotomy and a gastric fistula undergoes seventeen days' starvation. The gastric secretion is provoked daily by means of sham-feeding. It diminishes progressively until on the fifth day it stops altogether. Introduction of distilled water at once restores the secretory function of the gastric glands. Daily injections of water, however, have only a temporary beneficiary effect. After eight or nine days the secretion again begins to fall. Now the secretory function of gastric glands can be restored to normal only by the addition of sodium chloride to the water (0.7 per cent NaCl). Rosemann[33] and Frouin[34] repeated this experiment and obtained analogous results. These very sharp results were obtained in animals whose gastric juice had flowed out of the body. If the gastric juice enters the duodenum, it is neutralized there and Cl is reabsorbed in the form of sodium chloride. It is not easy to produce a Cl starvation even by giving to an

animal a diet poor in NaCl. (Conf. Rosemann's[35] criticism of Chan's[36] and Takata's[37] works). Rosemann also made a careful study of the Cl content of different parts of the body and gastric juice, and came to the following conclusions. The total Cl content of the body is very constant, amounting to 0.1967 to 0.2156 per cent of the body weight. The Cl content of various organs of a starving and of a fed animal is different, as can be seen from the following table (average figures):

	Starving animals	Fed animals
Cl content of the blood in p.c. of its weight	0.3270	0.3079
Cl content of the skin in p.c. of its weight	0.2865	0.2519
Cl content of the gastric mucous membrane in p.c. of its weight	0.3389	0.2680

We see that the percentage Cl content in starving animals is higher in the mucous membrane of the stomach than in the blood, and much higher in the skin, which is usually looked on as a depot of Cl in the body. Thus the gastric mucous membrane has a special attraction for Cl. During digestion, the loss of Cl by the mucous membrane of the stomach is much greater than that of the blood (20.6 per cent against 6.4 per cent in average).

The transportation of Cl in the body during digestion is as follows: From the gastric mucous membrane the Cl passes into the HCl and chlorides of the gastric juice. The losses are replenished from the blood, which in its turn takes Cl from its depots (skin, etc.). Now the blood is overloaded with Cl. To prevent hyperchloræmia, which cannot be compensated by the gastric secretion alone, the excretion of Cl through the kidneys is increased. Therefore, in most normal persons, simultaneously with the gastric secretion, there is an increased output of Cl with urine. Shortly after the passage of food-masses into the intestine, there begins the reabsorption of NaCl, which is formed from neutralized HCl of the gastric juice and NaCl of the food. This Cl is transported to its depot, and accumulated there. This period of digestion coincides with the diminished output of Cl through the kidneys (Boenheim[38]). Thus the Cl equilibrium is restored. But if the gastric juice is flowing out of the body, as it is in the case of a sham-fed dog, the reflex secretion of gastric juice stops as soon as the losses of Cl reach about 20 per cent of its total content in the body. (Rosemann[33]).

These physiological data lead us up to certain pathological problems concerning the gastric secretion. If the gastric secretion greatly depends on the Cl content of the body, there may be cases when an absolutely normal gastric mucous membrane will secrete an abnormally great or abnormally small amount of gastric juice in relation to the Cl metabolism of the body. And such cases really exist. There are many clinical observations concerning these important problems (see, e.g., Biernacki,[39] Arnoldi,[40] Leist,[41] Boenheim,[42] Molnár and Hétényi,[43] Molnár and Csáki,[44] Holler,[45] and others.) For the meaning of the thyroid glands in chlorine metabolism of the body consult Boenheim.[38] I quote here only one example.

There are certain forms of nephritis in which the function of the kidney in respect of the elimination of salts suffers independently of the function of nitrogen elimination, which may remain normal. The French authors give a special name to this condition "dissociated nephritis."[46] In such cases of nephritis, there may not seldom be found a hypersecretion of gastric juice, and vomiting of acid masses containing free HCl acid. This coincides with a diminution or disappearance of Cl from the urine (Bing,[47] Wolff and Martinelli,[48] Glurinski,[49] and others).

Moreover, in certain cases of gastric hypersecretion, which were looked on as a primary disorder, certain defects were found in the renal function. This could be proved by means of the following test. The patient is on a diet poor in sodium chloride (3 to 4 grm. daily). Administration of 10 grm. of NaCl increases the elimination of chlorides in the urine. But this elmination is very slow, lasting three to four days. In normal subjects the same amount of chlorides is eliminated in twenty-four to thirty-six hours (Bylina,[50] Crosa,[51] Goyenna and Petit[52]). Thus, there is a certain ground for the belief that in cases of retention of chlorides in the body, as a result of partial deficiency of the renal function, there is a compensatory elimination of them through the gastric juice. Vomiting relieves the body from the excess of chlorides; hypersecretion, not followed by vomiting, gives a temporary relief. Now the chlorides are transferred from the internal parts of the

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body to the alimentary canal on which we must look as an external surface of the body.

On the other hand, certain diuretics which increase the elimination of chlorides in the urine may lower the acidity and chloride content of the gastric juice. Thus, Heilig[58] found that in man two and a half to three hours after intravenous injection of 2 c.cm. of novasurol (other diuretics did not have such constant effect); the free HCl of the gastric content after a test-meal practically disappeared, and the total acidity was diminished, as well as the hydrogen-ion concentration. This phenomenon must be explained by the great elimination of sodium chloride in the urine provoked by novasurol.

From data reported in this paper, two conclusions may be drawn: (1) The mere finding of excessive or diminished acidity of the gastric contents does not give the right to speak dogmatically, either about the pathological state of the gastric glands, or even about their increased or diminished functional activity. Only a careful study of all conditions determining the reaction of the gastric contents will allow us to get the right idea about the functional state of the peptic glands; (2) the investigation of the gastric digestion is an important procedure, which provides the possibility of penetrating an intimate mechanism of the body. The gastric secretion reflects the normal and pathological state of several other organs (pylorus, kidney, ductless glands, etc.)

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Bacterium Pneumosintes and Influenza.—In a paper which appears in the *Journal of Experimental Medicine* for October, 1926, Milton W. Hall describes an experimental study, made during a recent epidemic of mild influenza, which was directed especially to the association of the bacterium pneumosintes with the disease. Some four or five years ago, Olitsky and Gates published the results of an extensive investigation which indicated relationship of this organism to influenza. Several investigators have since reported studies, of which some were confirmatory while others were not. The general attitude is skeptical. Hall's experiments appear to substantiate the claim that pneumosintes material predisposes animals to pulmonary invasion by organisms which ordinarily show no such tendency. Pneumosintes infections may be induced by subcutaneous injection of infected material.

THE CARBON MONOXIDE MENACE AND THE CANCER PROBLEM*

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THE increasing number of deaths from acute carbon monoxide poisoning, as well as the numerous and diversified sequelæ from chronic poisoning which may be found recorded in an already voluminous and steadily increasing literature on the subject, seem to justify reference to a carbon monoxide "menace." The importance of the cancer problem needs no comment. Whether the assumption be defendable or not, that the prevalence in civilized life of a gas capable of killing in absurdly small amounts might have some bearing on the cancer problem, may be deduced from the following data.

The points to be reviewed are: (1) sources of carbon monoxide; (2) effects of carbon monoxide; (3) physiologic concentrations of normal blood constituents; and (4) the chemical aspects of the cancer problem.

Sources of carbon monoxide.—The ubiquity of carbon monoxide in modern life can hardly be over-estimated. The investigations at the United States Bureau of Mines, of Henderson, Haggard and Coburn, Teague, Prince and Wunderlich, Sayers and Yant, and many others concerning the carbon monoxide content of automobile exhaust gas furnished conclusive evidence. Exhaust gas contains from 4 to 9 per cent, or 400 to 900 parts of carbon monoxide to 10,000 parts of air. A running car or truck puffs out one cubic foot of exhaust each minute (Teague[40]). A concentration of 15:10,000 inhaled for a very short time produces unconsciousness, which may prove fatal. A concentration of 6:10,000 causes fairly severe symptoms (headache, nausea, dizziness, weakness in the legs, and general lethargy) lasting from one to five days, as proved through experiments on themselves by Henderson and his heroic collaborators.

A concentration of 6:10,000 may be visualized by diluting three pints of milk with 625 gallons of water, the content of the average city sprinkling-cart. The highly dangerous concentration of 15:10,000 becomes "real" when expressed in terms of cubic feet, as was done in a journal on architecture: it is equal to one cubic foot of exhaust in 670 feet of good air. Thus a car, running in a closed garage (8 by 10 by 16 feet) which contains 1,280 cubic feet of air, may endanger the life of its owner in less than two minutes.

The number of automobiles and trucks in the United States alone rose from 1,000,000 in 1912 to 10,000,000 in 1920 and to 20,000,000 in 1926, according to the official registration figures. That the closed car may be a common, if little suspected, cause of acute and chronic carbon monoxide poisoning, may be deduced from details that will be given further on. Stationary gasoline-driven engines, such as are used for pumping water, threshing, mixing cement, lighting and many other purposes, are not included in the registration figures for "motor-driven vehicles," yet they all contribute their quota of carbon monoxide. Hamilton showed, moreover, that the fumes of benzol, which is commonly used to "improve" the gasoline, are nearly a hundred times more noxious even than carbon monoxide.

Chimney smoke was proved by Harris to have produced symptoms of acute carbon monoxide poisoning in seventy-five out of 125 workmen engaged in making uniforms for the army during the war. It was at first suspected that the cloth had been poisoned by spies, but it was found that a stairway leading to the roof had been left open and, acting as a funnel, had drawn all the smoke of a neighbouring chimney into the workrooms. McGurn,[26] in his critical review of fourteen cases of chronic poisoning, gives detail about one case in which the smoke

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of a neighbouring chimney could be proved responsible for the development of diabetes (sugar in the urine, 12 per cent), in a man who three months previously had been accepted as a class "A" risk for heavy insurance by two well-known insurance companies. To compute the amount of smoke from domestic chimneys, factories, railways, steamers, forest fires and other causes, which permeates the air and invades dwellings, would be an impossible task; yet all of this smoke contains variable percentages of carbon monoxide. Tobacco-smoke has been proved innocent of polluting the atmosphere by interesting experiments conducted at the United States Bureau of Mines; the experimental conditions were so severe as to be without parallel in daily life (*Science*, September 14, 1923, xii).

To speak of carbon monoxide poisoning in the Arctic regions sounds almost phantastic; yet the lives of Stefansson and his companions were seriously endangered by carbon monoxide vapours from a primus cooking-stove and Stefansson himself in his book, *My Life with the Eskimo* calls this episode "the most dangerous of our whole expedition." The fact that on a Wisconsin farm severe symptoms of carbon monoxide poisoning were caused by kerosene lamps burning in a poorly ventilated room, suggests that the experience of the Arctic explorer may be duplicated, in a lesser degree, in many humble homes.

The absorption, retention and subsequent diffusion of carbon monoxide by porous fabrics, such as blankets, upholstering materials and clothes, appears to be another, little suspected, but very real cause of carbon monoxide poisoning. This was proved by a case reported in the *American Journal of Public Health* and abstracted in the *Literary Digest* of May 31, 1924. A quilt, that had been stored for three weeks in a house in which a gas-leak developed during the owner's absence, was thoroughly aired outdoors for two days; it was then used to cover part of a cage containing a mouse. The next morning the animal was found in coma, and carbon monoxide was demonstrated spectroscopically in its blood. Similar observations made on woollen garments that had been stored in my house and which produced subjective symptoms of poisoning (nausea, giddiness, headache) during my personal experience with carbon monoxide from a defective hot-water heating system in 1920, received little credence. The mouse-test was not applied, but strongly positive tests for carbon monoxide in my blood and in that of two other persons (Katyama test) put the presence of carbon monoxide in the house beyond doubt. The foregoing data make further comment on the ubiquity of carbon monoxide seem superfluous.

Effects of carbon monoxide.—Carbon monoxide creates a relative oxygen-deficit in the body, not by destroying the erythrocytes, but by reducing temporarily the number of oxygen-carriers. A red cell which is laden with carbon monoxide cannot simultaneously carry oxygen; and carbon monoxide clings to the red corpuscle 300 times more tenaciously than does oxygen (Henderson). The relative oxygen-deficit thus produced is resented most strongly by any "weak spot in the body." Since twenty different persons may have twenty different weak spots, the variations in the dominant symptom and of the sequelæ in carbon-monoxide poisoning are not surprising.

Experiments on animals, reported by Henderson, Haggard, Teague, Prince, and Wunderlich,[12] showed that when saturation of the blood with carbon monoxide reaches 60 per cent, death invariably results, if illuminating gas or gasoline exhaust is used; but a blood saturation of 80 per cent was survived by the animals when chemically pure carbon monoxide made from formic acid was employed; this difference of 20 per cent of saturation for the lethal dosage is attributed by Henderson to additional toxic products in illuminating gas and exhaust. Loss of consciousness almost invariably follows when a blood saturation of 40 per cent is attained. How rapidly and under what conditions 40 per cent saturation may be reached will be seen from the following instances: The son of my chauffeur drove a car into his garage, shut off the engine and proceeded to close the doors. A strong wind must have forced a considerable amount of exhaust into the garage as the boy drove in, for he fainted while closing the doors. Fortunately his collapse was noticed by a comrade who dragged him out of the garage. When he finally regained consciousness (two separate attempts at rising had each ended in renewed syncope) he

was taken home, but thirty minutes later a test by the simple and accurate Sayers-Yant method still showed 40 per cent saturation in the blood. The second instance illustrates the risk in closed cars. Two young men driving a closed car in Winnipeg were overcome by the exhaust of their own engine; one of them lost consciousness completely, the other managed to cling to the steering-wheel and to drive to St. Boniface Hospital, but he collapsed on the hospital steps.* The dangers of collisions and unavoidable manslaughter from a car driven under those conditions may be imagined.

The after-effects of carbon monoxide poisoning, which have been reported, are so numerous that it would be impossible to quote them all, but the following selection shows their heterogeneous character: Henderson looks on pneumonia as the "most dreaded sequela" of severe gassing; he has also called attention to the activation of tuberculosis in garage men and proved that inhalation of carbon monoxide produced alkalosis and not acidosis as was supposed. It is interesting in this connection that both alkalosis and pneumonia were observed by Harrop and Loeb[11] in a typical, fatal case of lethargic encephalitis, of which the necropsy findings are given, and that, according to Loewe, Strauss, Thalimino, Maggiore and Sindoni and Rosenow, a strictly anærobic streptococcus is to be considered the causative agent in epidemic encephalitis.

Levin[18] in his extensive monograph (die Kohlenoxydvergiftung) mentions "carbon monoxide diabetes." Wilmer reports optical neuritis and other optical lesions, and a case of blindness caused by exposure to exhaust has been discussed by Murray.[27] The fact that both diabetes and impairment of vision occurred in a patient at the Mayo Clinic, who for eight years lived in a flat above a baker's shop, is suggestive, since the flat was "so filled with gas, that all the windows had to be opened," whenever the baker "damped" his oven.

Gangrene of the extremities, developing from a few hours to six months after carbon monoxide poisoning, has been reported by Levin, Riedel and Laignel-Lavastine and Alajouanine. A blood pressure of 250 mm. which developed after exposure to chimney smoke, which disappeared while the patient lived temporarily in another house, but reappeared on her return to her own home was observed by McGurn. Demonstrable and painful, though transient spasms of the veins on hands and feet were noticed during my personal experience with carbon monoxide (Luden). The occurrence of Buerger's disease (thrombo-angina obliterans) in a man who had worked for four years in an automobile testing-shop is interesting as pointing to the effect of carbon monoxide inhalation on the vascular system.

Phillips,[28] the English gynæcologist, reports the following case: a woman, four months pregnant, was gassed to unconsciousness by a leaky gas-jet; she recovered after four hours of treatment in a hospital and at first no ill effects on her pregnancy were noticed. At the end of six months abortion occurred, and in the heart-blood of the four-months fœtus, which showed no signs of decomposition, carbon monoxide could be demonstrated spectroscopically. How many still-born babies may be unrecognized victims of carbon monoxide poisoning?

Stevens[38] calls attention to the history of an infant, aged seven weeks, presenting symptoms of pyloric stenosis, but in whose blood 20 per cent concentration of carbon monoxide was found; the child died. An unused, slightly defective gas-fixture was discovered to be the cause of the intoxication. The mother had suffered from headaches; other members of the family had not been affected. Metrorrhagia, requiring radium treatment, developed approximately three months after prolonged exposure to carbon monoxide in an inmate of my house who had not suffered from this menstrual disturbance previously; the other symptoms of coal-gas poisoning presented by this patient have been published in detail. Two similar cases have come to my notice since, but in these the data which could be obtained, though suggestive, cannot be called conclusive.

It may be of value to surgeons to know that a man who had been overcome, well-nigh fatally, by exhaust while working under a car, showed sudden, inexplicable and alarming symptoms of collapse three months later on the operating table, during light ether anæsthesia given by a skilled anæsthetist for a minor surgical operation (reposition of patella). The possibility that the intolerance to ether, which was known not to have existed previously, might be connected with

*The details of this case were published in the *Victoria Colonist*, May 22, 1926.

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the after-effects of severe gassing with exhaust, seems admissible.

The manifestations of mild, chronic carbon monoxide poisoning are most deceptive: the symptoms are, as I have shown, often vague and disconcertingly diversified. The physician who keeps the ubiquity of carbon monoxide in mind and inquires after the gas-fittings will reap a harvest of gratitude from patients in whom a low grade of poisoning is causing vague aches and miseries, whereas a casual reference to "nerves" is likely to alienate the patient and may drive him into the arms of quacks.

Physiologic concentrations of normal blood constituents.—The deleterious effects of carbon monoxide become explicable when we consider the minute amounts with which the body works normally. These must be visualized to be appreciated (Luden[19]). According to Brown and Rowntree,[3] the total blood volume of an adult "varies from 72 to 100 c.c., with an average of 86 c.c. for each kilogram of body weight." For an adult weighing 70 kg. (154 pounds) those figures give a total blood volume of 6,020 c.c., roughly one and a half gallons, or the amount that half fills a kitchen pail. If 0.1 gm. for each 100 c.c. be taken as the average normal blood sugar and 0.5 gm. as a representative value for diabetes, the total amount of sugar in the half bucketful of blood of a healthy man will be one teaspoonful and the total blood of the patient with diabetes will contain no more than five teaspoonfuls of sugar. Kendall's studies on the thyroid hormone proved that the amount of iodine in the circulating blood is 0.013 mg. for each 100 c.c., which gives a total of only 1/100 grain (average dose of atropin) in all the blood. Rowntree found that the acidity of the blood in extreme acidosis is as acid as distilled water and its greatest alkalinity in alkalosis no more alkaline than tap-water. Stewart and Rogoff[39] demonstrated by means of bio-assay methods that the concentration of epinephrin in the adrenal vein (the highest in the body) is 1:500,000 and that animal tissues (cat's intestine was used) can detect epinephrin in a dilution of 1: 330,000,000. A concentration of one part in 330,000,000 may be visualized by pouring 10 c.c. of whisky into the pooled contents of 1,320 sprinkling carts, which is 826,000 gallons of water, while the procession of sprinkling carts would be six miles long. If the body works normally with "home-products" like iodine or epinephrine in such incredibly small amounts, is it likely that body cells will not be affected by the "fumes" of civilization?

The chemical aspects of the cancer problem.—Not many years ago reference to chemical factors in malignant growth was looked on as the rankest heresy. To-day the work of numerous investigators shows that the importance of chemistry in cancer research is a recognized fact. The investigations of Cramer[4] on the influence of sodium and calcium ions and on dietary deficiencies in cancer growth; of Drew on normal and malignant tissue growth in vitro; of Russell on carbohydrate and pentose metabolism in the surviving tissues and tumours of the mouse; of Freund and Kaminer[6] in Vienna on an unsaturated fatty acid in malignant tissues; of Redmond, Sendrail and Lassalle[29] in Paris on the blood lipoids in experimental tar cancers; and of Jorstad[15] in St. Louis on the action of lipoid solvents in the production of cancer, need only be recalled; innumerable other references might be quoted.

The important studies of Barnard and Gye on sarcoma called attention to an invisible germ, revealed by the invisible ultraviolet, which is found in the filtrable virus of the Rous chicken sarcoma, but they also showed that pure cultures of this germ failed to produce tumours unless "tumour juice" containing a "specific factor" was injected simultaneously; the properties of this specific factor are under investigation. Blair Bell's[1] therapeutic colloidal-lead injections for malignancy constitute, according to Wood, "a remarkable contribution to the therapy of inoperable cancer." The antagonism between cholesterol and lecithin is fairly generally recognized. Bell[2] called attention to the affinity for lead of tissues rich in lecithin. It may be of interest in this connection that in my studies on the blood cholesterol in malignancy in 1922, I observed a marked rise in the blood lecithin with simultaneous drop of the blood cholesterol after radiotherapy in a patient with inoperable gastric carcinoma. While the blood lecithin was high (Fig. 1), the patient was doing far better than expected; he was attending to his usual work as a gardener and even ate raw apples in the evening without any distress; but when, after an attack of grippe,

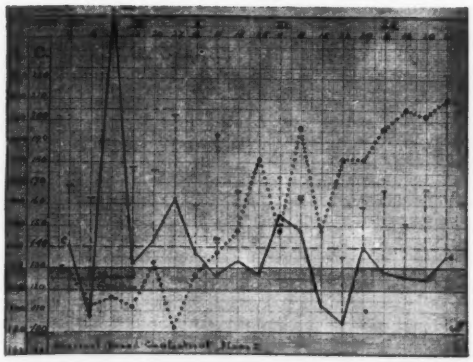

FIG. 1.—Increase in blood lecithin with satisfactory cholesterol value in a patient with inoperable gastric carcinoma while patient's condition was satisfactory beyond expectation. (Cholesterol, heavy line. Lecithin, dotted line).

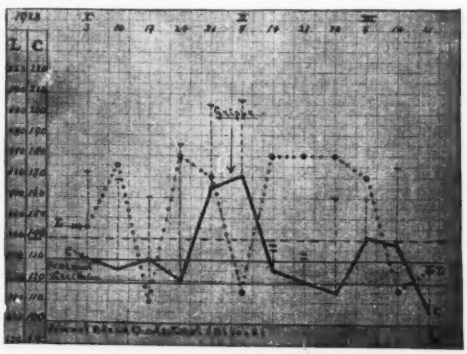

FIG. 2.—Fluctuations in blood lecithin with unsatisfactory cholesterol findings when patient's condition took a turn for the worse. (Cholesterol, heavy line. Lecithin, dotted line).

during which the cholesterol rose sharply, his condition took a turn for the worse, the lecithin showed frantic fluctuations (Fig. 2).

It would, obviously, be absurd to look on carbon monoxide as a so-called cause of cancer. That the relative oxygen deficit caused by inhalation of the deadly gas is capable, however, of upsetting the normal body chemistry, is amply proved by the after-effects, the diversity of which seems explicable only by a *locus minoris resistentiae* in the victim. The exact chemical disturbance required to promote or produce abnormal cell-proliferation has not yet been discovered; but the chemical aspects of the cancer problem are no longer deemed the day-dreams of deluded enthusiasts. A recent editorial in the *Journal of the American Medical Association* calls attention to the increase of cancer of the lungs, which used to be considered a rare form of malignant disease; the writer suggests that inhalation of irritating gases produced by automobiles, imperfect combustion of fuel and industrial processes may be a factor of importance. It may be difficult, however, to get clear-cut evidence on the effect of carbon monoxide on cell-proliferation because the chemical processes involved in normal as well as in malignant growth are extremely complex. Statistical inquiries may furnish clues (Hoffman,[14] Green[7]) or prove disappointing. But it will do no harm to remember that Wilmer calls carbon monoxide the "Frankenstein of civilization"; the automaton that turns on its maker, pursues him to the ends of the earth and finally destroys him.

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ACUTE GANGRENOUS CHOLECYSTITIS*

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THE cases I wish to present are illustrations of a condition which seems unusual and is known as phlegmonous or gangrenous cholecystitis. The literature regarding it is limited. There are a few references in Mexican and South American journals which are not available here. Mayo Robson[1] in his book on *The Gall Bladder and its Diseases* published in 1904, details two cases. He and Gibbon[2] of Philadelphia, who published a report of one case in 1902, quote Hotchkiss[3] as having given the first description of the disease in 1894, and Gibbon quotes Osler as alluding to it as a very rare condition. Ross[4] in 1906 reported five cases and reviewed the literature, finding eleven references, three of which I have already mentioned. In 1910 Tate[5] published an article on gangrenous cholecystitis. Cramp[6] writes of a gangrene of the gall bladder resulting from torsion of the cystic duct. Cottam[7] reports a case in 1917, as does Andrew[8] of Sydney, New South Wales, in 1923. It would thus seem that my experience of seven cases in seven years is somewhat unique.

These cases were all surgical emergencies characterized by fulminating inflammation. I shall briefly summarize their histories:

Case 1.—A man, fifty years of age, was seized during the night of June 30, 1919, with severe pain in the upper part of the abdomen. I found him a few hours later in a state suggesting shock. His temperature however was 102° F. His pulse was rapid and the rigidity of the upper segments of both recti muscles was present. This rigidity was extremely marked on the right side, a leucocyte count was made and reported as 15,000 per cm. I operated within eight hours after the onset and encountered a large gall bladder in a state of gangrene. As I applied packs to isolate the viscus, the gall bladder was left without other support than its attachment to the liver. By its own weight it separated from the liver and lay in the abdomen attached only by a pedicle containing the cystic duct and artery. A clamp was applied which cut through necrotic tissue and the gall bladder was left free in the abdomen. A ligature placed behind the clamp completed the most rapidly executed chol-

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ecystectomy I have ever seen—about three minutes. A drainage tube was placed and the wound closed. The man promptly recovered.

Case 2.—An Italian woman, forty years of age, had been ill for four days when she was brought to the hospital late on a Sunday night with a diagnosis of gall bladder disease; as she was jaundiced, temporizing had seemed to be justified. Although she became moribund before morning, it was decided to operate in the desperate hope of relieving her. Again a gangrened gall bladder fell from the liver. A ligature could not be placed easily and time was precious, so the pedicle was clamped. Again the forceps cut through necrotic tissue, but this time it came away with the gall bladder. A small hæmorrhage was controlled, but the patient succumbed, a victim of procrastination justified by the emphasis hitherto laid upon the advisability of not operating upon the gall bladder, while it is in a state of acute inflammation.

Case 3.—A woman, thirty-four years of age, was seen by her physician in what appeared to be an attack of acute appendicitis. The whole of the right rectus muscle was rigid, but the area of tenderness extended up to the hypochondrium. A mass could be made out in the right iliac fossa. The temperature was elevated to 101° F. and a high leucocyte count was found. At operation which was done within twenty-four hours, a very large gall bladder whose fundus reached to the ilio-cæcal juncture was found. In appearance it is described as resembling a large over-ripe cucumber. The walls were thickened and mottled in a greenish yellow colour with recent adhesions of omentum partially covering it. Cholecystectomy was done, and the wound closed with drainage. A prompt and complete recovery followed.

Case 4.—A man, thirty-two years of age, who had suffered from indigestion for two or three years, had had no attack of colic or any acute pain until the morning of his admission to the hospital. The onset was sudden with agonizing pain followed by shock. There was marked rigidity of the upper half of the abdomen, elevated temperature and high leucocytosis. The area of liver dullness was not altered. Immediate operation disclosed a small gall bladder with a stone, the size of an almond, half extended through an ulcerated area in the fundus. It, with several other stones was removed; a tube was stitched in the gall bladder and the wound was closed with split tube drainage in the subhepatic space. A good recovery followed.

Case 5.—A woman, sixty years of age, who had had a full meal in the evening was seized a few hours later with pain in the epigastrium, which steadily became worse. Her physician found her early next day with a temperature of 99.5° F. and rigidity of the upper half of the recti muscles, more marked on the right side. There was steady pain in the epigastrium and tenderness over the gall bladder. The pain was relieved by morphine but the symptoms persisted. The patient was sent to the hospital the following morning. The rigidity and tenderness had increased. The temperature was 101° F., and the leucocyte count was 22,000 per cm. The patient was very ill, so operation was undertaken at once, some thirty-six hours after the onset. The gall bladder was greenish-black in colour; its walls œdematous and recent omental adhesions practically covered it. Aspiration brought a quantity of purulent material. A number of stones were removed, and the viscus drained. Drainage of the subhepatic space was provided, and the wound closed. Bile flowed on the third day. A fistula persisted for nearly four weeks but the patient made a good recovery.

Case 6.—A man, of sixty-five, after eating a heavy supper, was awakened about midnight with severe epigastric pain, which modified under the soothing action of a hot water bottle. He was very uncomfortable all the next day, and remained in bed. During the night the pain became agonizing, and he sent for his physician. This young man has a peculiarity of temperament, as you will admit when I tell you, that he took his microscope and hæmocytometer when he went to make that call at three o'clock in the morning. He found his patient in a state of profound prostration, with extreme tenderness in the right hypochondrium, and with rigidity of the whole abdomen, a temperature of 102° F. and a leucocyte count of 30,000 per cm. The man refused to be moved till the morning, so that it was ten o'clock before I could operate. I encountered a large quantity of bile-stained exudate, which was removed by suction. The gall bladder was dark and œdematous, but not tense. It contained stones. It had evidently ruptured in the ampulla, but the site of rupture was not identified. A cholecystostomy was done as rapidly as I could accomplish it. The man died thirty hours later. Another case of procrastination but, in this case, neither physician nor surgeon was guilty of its practice.

Case 7.—A woman, sixty-four years of age, was brought forty miles in a motor car to the hospital. She had seen her physician twenty-four hours previously as she was suffering from what appeared to be an ordinary attack of biliary colic. A sedative was given, and the physician saw her the following day. By this time, there was fever, localized tenderness and marked rigidity of the right rectus in its upper segment. On arrival at the hospital these symptoms were found to be increased and a leucocyte count of 16,000 was found. The same greenish-black colour was encountered, when the gall bladder was exposed. The normal gloss had not completely disappeared, but omental adhesions were beginning to form. A cholecystostomy was done after removal of a number of stones with complete relief. This patient went home at the end of two weeks. Six weeks later I saw her. A very small fistula had opened and closed several times, but she was able to do light housework. I suggested that her medical attendant keep a lookout for a calculus that might have been missed in the necessarily hurried exploration.

To these cases I may add one, in which I assisted Dr. Silverthorn some three years ago. The patient was a woman about sixty years of age, with a history of chronic cholecystitis, which had developed into an acute attack beginning two days before operation was performed. The gall bladder was œdematous and cholecystostomy was selected as the procedure to be adopted. A number of stones were removed but the whole mucosa of the gall bladder was found to have sloughed. This woman recovered.

Another case occurring in the same week as Cases 6 and 7 was reported to me by a colleague. A woman of seventy-two years of age was taken suddenly ill after a fairly hearty supper. Her physician diagnosed influenza. On the third day an internist was called in consultation, and corrected the diagnosis to one of acute cholecystitis. The patient was then moribund and died in a few hours. There can

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be no question as to what would have been found had operation been done within twenty-four hours of the onset of the symptoms.

The cases I have described may, I think with fairness be classified as phlegmonous cholecystitis or gangrenous cholecystitis. Its etiology is most obscure. In onset it resembles mesenteric thrombosis or, possibly, acute pancreatitis. The rapid advance of signs of inflammation change the resemblance to one of acute gangrenous appendicitis. and, in cases of an arrested descent of the cæcum, accurate diagnosis might be difficult or impossible. It is less difficult to differentiate rupture of the stomach.

The history of biliary disease is seldom so definite as to be helpful. Robson speaks of a case, with no previous symptoms pointing to gall bladder disease. My own observations do not add much. In every case stones were found, but in no case was there a history of repeated attacks of colic. Only one patient in my series had ever been jaundiced. The onset in every case was sudden; the fever and high leucocyte count were regular features, and the progress downward was rapid.

Cultures of the gall bladder content and of the tissues of the gall bladder itself were made in most of the cases, and yielded but one organism; *B. coli communis.*

Torsion of the viscus appears impossible although, as I have noted, Cramp described a torsion of the cystic duct; and embolus of the cystic vessels, in patients not suffering from any other infection, is so improbable as to be dismissed without discussion. Interruption of the circulation from spasm due to an impacted calculus is the most plausible hypothesis offered. In other words, strangulation precedes infection. The histories I have outlined seem to confirm this. The sudden onset, the state of shock, and the rapid sequence of the signs and symptoms of local peritonitis bear out the hypothesis. An acute cholecystitis proceeding to gangrene would produce a similar condition in time, but would lack the initial shock as in the case reported by Tate, where a month elapsed before the state of gangrene was found at operation.

Have I advanced a new argument for radical treatment in chronic gall bladder disease?

The procedure to be adopted has caused me much searching of heart. Are we to deal with the gangrened gall bladder, as we would with a gangrened appendix? If we agree that there are many cases of gangrenous appendicitis in which rapid evacuation of the abscess with drainage is the best treatment, the answer is obvious. If we insist that the ideal operation is the only operation to be done in all cases, we must be prepared to maintain our position. In the cases detailed, I was forced to do a cholecystectomy in two; I chose to do a cholecystectomy in one; the others were drained. In these cases the patients were so very ill that Murphy's dictum "get in quickly and get out quicker" seemed to be particularly applicable. The organism found was generally the *B. coli communis,* but one cannot be sure that there may not have been another of more virulence. Exposing a large area of liver in a region so richly supplied by lymphatics must be of great risk in a case in which the peritoneum itself is acutely inflamed, and peritonization of the denuded area is impossible. The consequent adhesion of neighbouring viscera might readily become a serious complication a few weeks after operation. I would therefore advocate cholecystectomy in cases seen early, when the serosa is still glossy, and the ducts are not necrotic, and in which the omentum may be brought up to protect the duodenum and colon from deforming adhesions. Thus far I agree with the conclusions recently stated by Bazin. Sir Berkeley Moynihan advocates this as an ideal procedure in the latest addition of his work on *Abdominal Operations.* E. D. Martin in the *Southern Medical Journal* proposes splitting the diseased organ through its whole length and draining. This amounts to cholecystectomy as an end result, since the gall bladder will be obliterated by fibrosis. This will also prove to be the case when regular cholecystostomy is done in cases of advanced inflammation. In communication with Dr. Thomas Cullen of Baltimore a few weeks ago he said that he practised amputation of the greater part of an enlarged gall bladder and drainage of the stump when gangrenous cholecystitis made cholecystectomy a formidable procedure. This, and the proposal of Martin, appeals to me and I am glad to have it as another way out of a situation, which as I think I have shown, may

call for the exercise of trained judgment under very urgent circumstances.

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ON TERMINAL DISINFECTION

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THERE is going on at the present time in medical journals, on both sides of the Atlantic, a fairly widespread discussion regarding the necessity of terminal disinfection. In the minds of many general practitioners and some medical officers of health, there is a good deal of doubt as to the disinfection necessary in the routine treatment of the common communicable diseases. This is not surprising, when there exist well defined differences of opinion amongst the world's leading sanitarians.

Not many years ago he was a bold individual who questioned the need of terminal disinfection or even terminal fumigation. To-day there are those who are seriously sceptical of the practical value of isolation and quarantine.

The importance of disinfection was deeply implanted in medical men during the second era in the development of modern public health, when the discoveries of Pasteur and the application of bacteriology gave a new turn to preventive medicine. For twenty-five years the best efforts of public health workers were directed to securing efficient isolation, quarantine and disinfection, when dealing with communicable diseases, and all credit must be given that generation for its accomplishments. But notwithstanding their enthusiasm and faith their success was limited and these diseases continued their course as before.

Why? Because the advances made in the knowledge of bacteria and epidemiology, and the development of laboratory methods showed these diseases were not and could not be completely stamped out by these means alone. This was for the reason that many are communicable before the disease is recognized, because mild and atypical cases are missed, and on account of the menace of the carrier.

With this newer knowledge there came, too, the belief that certain communicable diseases are spread directly from sick to well by contact and droplet infection—that the person and not the place is dangerous. Such being the case, it naturally followed that doubts should arise as to the necessity for terminal disinfection. In order to make things clear it would be well at this stage to give some definitions.

Communicable diseases are those caused by specific micro-organisms. The terms contagious and infectious are no longer used as they are misleading and confusing. Under the term communicable diseases are included the following:

Measles	Tuberculosis
German measles	Anthrax
Scarlet fever	Cholera
Whooping cough	Favus
Diphtheria	Glanders
Smallpox	Leprosy
Chickenpox	Paratyphoid fever
Mumps	Pneumonia (acute lobar)
Cerebrospinal meningitis (epidemic)	Rabies
	Dysentery
Actinomycosis	Gonorrhœa
Ankylostomiasis	Malaria
Dengue	Plague
Poliomyelitis	Rocky Mountain fever
Septic sore throat	Tetanus
Syphilis	Trichinosis
Trachoma	Typhoid fever
Acute infectious conjunctivitis	Typhus fever
	Yellow fever

It is understood that the modes of transmission of these diseases are:

1. Direct: (a) direct contact; (b) indirect contact.

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2. Indirect: water, food, soil, etc.
3. Intermediate hosts: flies, fleas, mosquitoes, etc.

Direct contact occurs when the infection is carried to the mouth or nose, as in kissing or close association, or in droplet infection when the germs are coughed or sneezed into the faces of others.

The indirect contact transmission of disease may occur if articles or objects, wet with secretions, such as towels, toys, pencils, eating utensils, linen, etc., are carried to the mouths of susceptible individuals, or if fingers touching such are brought to the mouth or nose. Contact infection implies a rapid and close transfer of infectious material from person to person.

Disinfection means the destruction of pathogenic bacteria.

Concurrent disinfection is that carried on during the course of the illness, and implies the quick disinfection of all discharges and secretions and articles freshly soiled with such secretions.

Terminal disinfection is performed after the recovery, removal or death of the patient, and is applied to the room and its contents. Fumigation implies the destruction of bacteria, mosquitoes and small animals by means of gases.

In the early days of the germ theory the air was supposed to have been the chief medium for the transmission of disease germs. It was thought the breath of the patient filled the room and house with infective germs—that the poison was carried outside, even long distances in the air. One writer with a lively imagination said, "Disease is literally borne on the wings of the wind."

The great surgeon, Lister, believed in the air-borne theory, and for some time used a spray of carbolic acid in the immediate vicinity of an operation. The modern surgeon pays no attention to the air of his clean well-ventilated room. In 1881, the Local Government Board in England advised that a smallpox hospital be erected if possible a mile or more from houses.

We know now that diseases are not air-borne, that while the plasmodium causing malaria passes through the air, it is in the body of the mosquito, and if the mosquitoes are removed and kept away from the patient, there is no danger of disease transmission, and we know aseptic nursing prevents the spread of disease in communicable disease hospitals. A typhus patient, after a bath and a clothes' disinfestation, may with perfect safety be placed in the general ward of a hospital.

To-day, no one ever thinks of putting carbolic acid in open pans for disinfecting the air of rooms, or hanging sheets soaked in corrosive sublimate over doorways.

Germs are present in the moisture of the mucous membranes of the nose and throat, and in the saliva of persons ill with measles, diphtheria, scarlet fever, etc. In coughing or sneezing or loud talking or expectorating this moisture is expelled as a fine mist or minute droplets. The germs rapidly fall to the floor, but they may be suspended long enough in the air to infect others close by, or they may be carried short distances by currents of air. How far they are conveyed is hard to say. Gordon, in ventilating studies in the British House of Commons, recovered *B. prodigiosus* seventy-one feet from an individual who was broadcasting the germs by speaking. Chapin,[3] on the other hand, states animal experiment has shown droplet infection is not effective at a distance greater than two or three feet. Leonard Hill[11] refers to the reduction in the meningococcus carrier rate from 30 per cent to 2 per cent when soldiers in sleeping huts were separated by putting the beds two and a half feet away instead of six inches.

Germs, especially the spray-borne ones, die very soon after leaving the human body. They cannot live long without the warmth and moisture of the body. They die quickly on the dry floors, walls and bed clothes. Dryness and sunlight are very effective natural disinfectants, and of the two the former is of more practical value. The effect of dryness on the life of bacteria is seen in laboratory practice where many bacteria soon die on dry artificial media. In fact it is practically true that non-spore-bearing bacteria die almost as soon as they dry.

Direct sunlight will kill most germs, including the tubercle bacillus, in a few hours. It was formerly thought that the virus of smallpox and the tubercle bacillus were much more

resistant than other pathogenic bacteria. But now we know the former dies before the average non-spore-bearing bacteria and the latter is soon killed by direct exposure to the sunlight and air. Rosenau[8] believes it unlikely that dust, under ordinary circumstances, would contain dangerous numbers of live tubercle bacilli. The view generally held is that the danger from spray infection is not great beyond a distance of four or five feet on account of the enormous dilution.

There is, then, every reason to think that such germs do not get very far from the immediate environment of the patient, the bed, and contents, in which case the whole room would not be infective.

It may therefore be assumed that the non-spore-bearing bacteria, causing communicable diseases, die very quickly when deposited on dry floors, walls or bed clothes. Those that have not succumbed are very much attenuated.

Again, it is generally believed that the greatest period of infectiveness of such communicable diseases as measles, smallpox, chickenpox, scarlet fever, whooping cough, is before the characteristic symptoms appear and the disease is recognized. So that before convalescence is over, most germs that would have reached walls, floors or clothes, are dead, and the room with its contents by this time is quite free from infection. If the patient is removed to hospital, to another room, or dies during the early acute stage of the illness, there would be more danger of room infection, and need for more extensive disinfection.

It would then seem that in the treatment of communicable diseases, proper concurrent disinfection together with airing and sunning for twenty-four hours would be sufficient to destroy infection.

In the past, too much attention was put on the room and surroundings and too little upon the patient, the actual source of infection. Terminal disinfection after the communicable diseases is not necessary. There is no need for spending time, energy and money in this way, provided efficient concurrent disinfection has been done.

Terminal disinfection has not been practised for years by Dr. C. V. Chapin, Superintendent of Health, Providence, one of the foremost public health administrators in the United States, and no ill results have followed. It has been safely discontinued on a large scale by Professor Chagas, Director-General of Public Health in Brazil. It has been dropped by Dr. W. Rimpau, Director of the Bacteriological Institute of Munich. The younger school of sanitarians in England is becoming very sceptical of the value of terminal disinfection after scarlet fever and diphtheria. A committee of the American Public Health Association in a report, in 1923, on the control of communicable diseases, recommended thorough cleansing and airing as the only terminal disinfection necessary in measles, whooping cough, scarlet fever, diphtheria, etc.

It is only fair to state that there are some public health authorities in this country and more in England who still firmly believe in the value of terminal disinfection and fumigation. It is worth noting, however, that the stoutest champion of this school, Professor Kenwood, is on the defensive and in a recent article in the *Lancet*[9] states that, "a prolonged enquiry is necessary to get at the truth, which is elusive and difficult to arrive at, and that in the meantime we are not justified in denying to the public a measure of probable protection."

All the authorities quoted, while favouring, wholly or in part, the dropping of terminal disinfection, yet have an undiminished faith in disinfection itself, when done in the right place and at the right time.

From our present knowledge of bacteriology, and the way in which infection is spread, it would seem that in the control of communicable diseases, greater dividends can be obtained by investing the money now spent on terminal disinfection in:

1. Popular education in personal hygiene by public health nurses, etc.
2. Immunization.
3. Concurrent disinfection.
4. Controlling carriers; missed or atypical cases.

Terminal disinfection as performed at present in many places is useless, and might as well be abandoned. It is not believed in by many medical officers of health, who carry out some form of it, because health regulations require that they do so. The value of it is doubted by others who, as a consequence, naturally allow it to be done in a very casual manner. This does not mean, of course, that it is not efficiently completed by

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many conscientious health officers, whether or not they approve of it.

Conclusion.—From this review it would appear our aim should be—efficient concurrent disinfection.

Fumigation would only be necessary to destroy mosquitoes, fleas, vermin, etc., when dealing with insect-borne diseases.

Room disinfection.—In order to complete this article a short note is added indicating a simple, effective and practical method of carrying out a sick room disinfection.

Disease germs come away in the discharges and secretions of the body. The principal objects therefore requiring disinfection are: sputum, fæces, urine, articles soiled with secretions, and things handled and mouthed by the patient.

There are two extremely important things to be realized in practical disinfection: first, that the disinfectant be efficient; second, that a sufficient quantity be added in the proper strength, and that time be given it to reach the imbedded germs.

Sputum.—1. Burn all rags, cloths, paper, etc., containing sputum or other discharges from mouth and nose. Any handkerchiefs should be boiled for twenty minutes before being washed.

2. Boil, after adding water.

3. When sputum cup containing only a small quantity of izal is half full, add an equal quantity of izal 2 per cent. Allow to stand for two hours, then empty in toilet or bury.

Fæces.—1. Mix with an equal quantity of izal, 2 per cent, or chlorinated lime 5 per cent, or acid perchloride of mercury 1-500—one ounce hydroloric acid to three gallons of water. Stir well with a stick, leave for one hour then bury.

2. Mix with sawdust and kerosene and burn.

Bed pans, cuspidors, urinals.—Boil for one half hour.

Glassware and rubber goods not standing heat.—Soak in 2 per cent izal for one half hour.

Water closets, privies, basins.—Scrub with soap and hot water to which washing soda is added.

Food.—Burn all remnants.

Dishes, knives, forks, spoons, utensils.—Put in a pan and boil for twenty minutes, and finally wash.

Blankets, linen, pillow cases.—Boil for one half hour then wash. If soiled with blood or fæces, first soak in cold water, to remove stains, then boil.

Mattresses.—If small areas are heavily soiled, scrub with 2 per cent izal. If not stained, air and sun for six hours.

Curtains, hangings, draperies, carpets, upholstered furniture, shoes, gloves, personal clothing, pictures.—Sun and air inside or outside house for twenty-four hours.

Books.—Store for two weeks in a dry place, by which time all non-spore-bearing pathogenic bacteria are dead.

Hands.—Scrub with soap and hot water.

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The Rheumatic Child.—A paper on this subject by A. P. Thomson (*Journal of State Medicine*, October, 1926), concludes with the following summary: The rheumatic state in childhood is a condition which frequently exists without any clamant symptoms of ill-health; nevertheless, it is dangerous, for it may lead to serious affections of the heart. As the result of rheumatism acquired in childhood, about 30,000 people die each year in this country from heart disease. Their deaths are preceded often by long periods of suffering and invalidity. Further, the rheumatic state deprives many children of the advantage of normal education. Two important factors in the production of the disease are poverty and damp: until these factors are dealt with rheumatism in children will probably continue. A great deal can be done to mitigate the consequences of rheumatism if the diagnosis is made early and suitable accommodation is provided for the patients.

HEREDITARY ABNORMALITIES OF THE EYE

II. Inheritable Defects Involving the Eyelids and Their Mode of Transmission*

By Madge Thurlow Macklin, M.D.

Department of Anatomy of the University of Western Ontario Medical School

THE eyelids and the muscles which serve to open and shut them are exceedingly important components of the visual apparatus, and defects in them frequently lead to imperfect vision, and sometimes even to total blindness, despite the presence of originally normal eyes. Poets have sung of the eyes as the "windows of the soul," so that it may not be inapt to compare the eyelids to the window blinds. Eyelids that fail to function properly may be likened to blinds whose spring is broken and so will not go up, or will not come down.

The adjustment of the width of the lid slit, although under control, has been relegated to the subconscious self for supervision, as has walking, for instance. Quite unconsciously we open our eyes to an extent greater than usual when we are surprised or terrified; we partially close them in order to exclude too strong a light, or in moments of embarrassment or shame. Imagine, then, the person who, afflicted with ptosis of the eyelids, cannot lift them sufficiently to see clearly, and must go about all his life with a sleepy, indolent expression; or conceive of the unfortunate man, who, suffering from lagophthalmus, cannot pull his lids down to cover his aching eyes, but must constantly wear an expression of terror, even in his happiest moods. Although these individuals are to be pitied, many of them can see to some extent, at least, and thus they are not so handicapped as is the man, born with cryptophthalmus, whose lids are permanently and irrevocably shut.

All three of these conditions may be inherited, and since they are the most severe of the hereditary abnormalities which affect the eyelids, they will be dealt with at greater length than those conditions which, although hereditary, are merely displeasing from the cosmetic point of view.

Hereditary ptosis.—Not all cases of ptosis are hereditary. Some are the result of an injury to the eyelid, while others are caused by paralysis of the third nerve, or the branch of it which supplies the levator palpebræ superioris, or by paralysis of the sympathetic supplying the smooth muscles of the musculus tarsalis superior (Fuchs[6]). Some cases are due to tumours whose weight pulls down the upper lid. All of these causes are apt to produce only a unilateral ptosis, whereas the hereditary type is almost always bilateral.

Hereditary ptosis appears to be the most common of the inherited abnormalities of the eyelids—at least there are far more records of this defect than of any of the others. It is due to the absence or impairment of the muscle which normally elevates the upper lid, the levator palpebræ superioris.

The severe handicaps which weigh upon those suffering from this disability are well brought out in the following clinical picture from the work of Briggs.[2] Fig. 1 illustrates well the narrowed palpebral fissure, and the wrinkled forehead which is characteristic of most of these patients, who, deprived of the use of the eyelid-elevating muscles, call into operation the occipito-frontalis, leading to the transversely-furrowed brow and a resultant perpetual expression of surprise. In severe cases this recourse is inadequate to uncover the pupil, and to overcome the deficiency the eyeball is rolled down and the head is thrown back to compensate for the deflection of the optical axis—a pose which is slightly evident in the man in Fig. 1. The child to the left, in this figure, shows such a well developed case of ptosis in the left eye that, even when contracting the occipito-frontalis to the maximum she is unable to lift the lid. The concomitant drawing of the

* Part I., Laws of heredity and their exemplification in the inheritance of eye colour, *Canad. M. Ass. J.*, Nov., 1926, xvi, 1340.

mouth over to the left side may be due to an overflow of stimuli to other muscles supplied by the overworked seventh nerve.

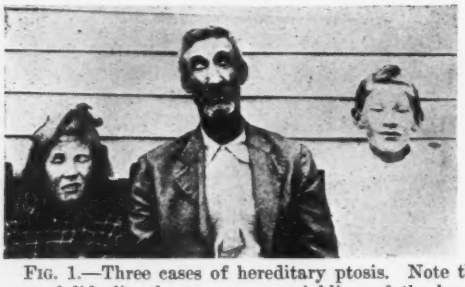

FIG. 1.—Three cases of hereditary ptosis. Note the narrowed lid slit, the transverse wrinkling of the brow, and the backward tilt of the head, best seen in the man. (After Briggs).

In severe cases of ptosis, the palpebral fissure may be so narrowed that light is admitted only through an opening in the mid-line. The patient fixes the eye so that the pupil is always held opposite this small aperture between the lids, and in order to bring objects which are situated at the periphery of the visual field, into the direct line of vision, he turns the entire head, rather than the eyes, to one side or the other. It happens occasionally that the extrinsic muscles, in such cases, become non-functional, possibly from disuse. The ophthalmoplegia may be partial or total.

Ptosis, besides occasioning grievous physical infirmity, may be provocative of severe mental distress. The embarrassment caused by the possession of the abnormality, and the inevitable and perpetual comments of the friends and neighbours is attended by a more or less severe strain. A family in Georgia who suffered from ptosis were known to the community as the "slit-eyed people." The afflicted members of another family went by the soubriquet of "little eye," and viewed with dismay each new baby which bore the family stigma. It is obvious that this defect places the patient at a very serious physical and mental disadvantage. He may even become a charge upon his relatives or the public.

Mode of inheritance.—How, we may ask ourselves, is hereditary ptosis transmitted? (1) Does it affect males as frequently as it affects females? (2) Do both sexes transmit it with the same frequency? (3) Do parents of either sex transmit it to children of both sexes? From a careful consideration of a great many pedigrees we may answer all these questions in the affirmative. By referring to Fig. 2, a record compiled by Bradburne,[1] we see that twelve females and four males exhibited ptosis, but other pedigrees show a greater proportion of affected males. Briggs records thirty-three males and thirty females affected. We may conclude that, on the average, it affects both sexes with the same frequency.

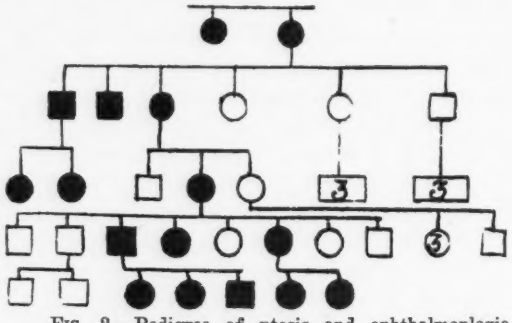

FIG. 2.—Pedigree of ptosis and ophthalmoplegia occurring in five generations. In this and all subsequent pedigrees squares indicate males, and circles females. Clear symbols filled with a number indicate a corresponding number of unaffected offspring. (After Bradburne).

In answer to the second question we find that. in Fig. 2, the mother transmitted it to her children four times, and the father only twice. Again, Brigg's pedigree shows the opposite condition, the father transmitting ptosis seventeen times and the mother six times. Thus, when a sufficiently large number of pedigrees is examined the deviations from the average in one are counterbalanced by deviations in the opposite direction in another. On the whole it is safe to state that fathers and mothers are equally liable to pass on this defect to their offspring.

The third question finds its answer in the pedigree shown in Fig. 2. The mother in the first generation transmitted ptosis to two sons and a daughter, and the father in the fourth generation passed it on to two daughters and a son. Hence the assumption that either parent may pass it on to children of either sex, finds strong support in this pedigree.

Does ptosis tend to become eliminated in families, either by a lessening of the severity in the succeeding generations, or by fewer people becoming affected? Both these queries are answerable in the negative. Briggs states that in the family investigated by him, in which the

defect had lasted through six generations over a period of 125 years, affecting sixty-four out of 128 persons, the ptosis was more severe in the sixth generation than in the fourth and fifth. That more and more are being affected according to the fecundity of the affected parents, is evident from the pedigree of Briggs just referred to, in which, from one person affected with ptosis, sixty-four defective descendants had sprung. There can be no talk of defects decreasing in the face of a pedigree like that. Nor is this an isolated example.

Is ptosis a dominant or a recessive character? If we examine the pedigree in Fig. 2 again we see that it did not skip a generation, it was never shown by children whose parents were clear of it, and was passed on to some, at least, of the children of those who were affected. All these qualifications agree with the theory that ptosis is due to a dominant factor. If we now refer to Table I in the first paper of this series[13] we see that the matings in Fig. 2 are comparable to those in Mating V, and that ptosis is like brown eye colour in its manner of transmission. The affected persons were hybrids, carrying the dominant factor for ptosis, and the recessive one for normal lids; and the normal persons were carrying two recessive factors for normal lids. In such a mating, half the children are apt to be affected, and in Briggs' pedigree, exactly 50 per cent were affected. In Fig. 2, if we count only those whose parents the chart shows to be abnormal, we find twenty-four such persons, fourteen of whom are affected. This makes 58 per cent, which is fairly close to the expected average. Not too much stress can be laid on mathematical accuracy of proportions of normal and abnormal in human pedigrees since the families are too small to permit full sway to the operation of chance. Two other pedigrees by Münden[15] and Heed,[8] show the defect running through four generations and acting as a dominant character.

Hence we may state to a person affected with ptosis, of the hereditary type, that, on an average, half his offspring will show the disease.

Occasionally one finds cases or records of cases of ptosis that appear to be of the hereditary type, but in which the parents of the affected child were said to be perfectly normal. Sattler[18] reports a case of that kind, and the proof that the defect was hereditary came when the man afflicted with it married and had four sons all of whom had well developed cases of ptosis. For such examples of ptosis, and indeed for all *dominant* characters which arise in the children of parents who did not exhibit the defect or the character in question, three explanations at least are possible. The first is that one of the parents had the defect, but to so slight a degree as to be unnoticed by lay observers. The second is that the defect arose as a mutation in the germ plasm of one of the parents. The defect would then continue to be passed on by those exhibiting it. Such spontaneous mutations of the germ plasm (to be carefully distinguished from the inheritance of acquired characters), have been observed many times in the banana fly, *Drosophila*, whose heredity is perhaps better known than that of any plant or animal.[14] The third possibility is one that must not be overlooked. In some cases the paternity of the child may be other than that stated, and the real father may have had the defect.

Lagophthalmus.—Lagophthalmus, the opposite condition to ptosis, may be defined as the accentuated retraction of the upper lid, with inability completely to cover the eye, when the lids are closed. This condition is not always of the hereditary type. It may be due to loss of skin on the lids through burns, ulcers, etc., to ectropion, and exophthalmos. In the only record of hereditary lagophthalmus which is available, (Peters[17]) states that the defect was caused by a congenital deficiency of the orbicularis oculi muscles, which left the levators of the lids without their normal antagonists.

Clinically, the patient shows an abnormally wide-open eye, with no protrusion of the eyeball as in exophthalmos, and with no wrinkling of the brow. A chronic conjunctivitis or even keratitis is the usual accompaniment of the severer cases, at least, due to the constant exposure and drying of the cornea. If a corneal opacity develops, partial or even total blindness may supervene.

Less common than ptosis, if one is to judge by the number of cases reported in the literature, lagophthalmus is like ptosis in being inherited, and in being a dominant character. It apparently is not passed on by those who do not possess it, and it is inherited by the offspring

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of those who do. The pedigree reported by Peters (Fig. 3) is of a family in which the abnormality had shown in four successive generations, and had occurred in females only. We cannot conclude from the latter statement that its distribution is sex limited, since the pedigree is very small. There may have been few or no brothers of the afflicted sisters in this family, so that the limitation of the defect to the female sex may be purely fortuitous.

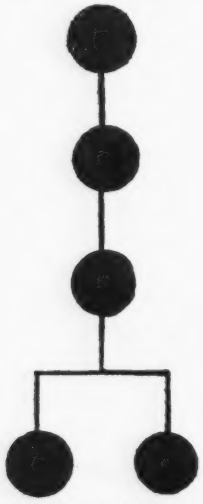

FIG. 3.—Pedigree of lagophthalmus. (After Peters).

To the inquirer after knowledge, we may say that affected persons have the capacity of transmitting this defect to their offspring in the same proportion that they have of transmitting the factor for normal lids, in other words, half their children are apt to be afflicted with lagophthalmus.

Cryptophthalmus. — Cryptophthalmus is the most serious of the inheritable defects of the lids. The integumentary folds forming the eyelids, arise at the end of the seventh week of intrauterine life and fuse at the ninth week. They remain so fused until the seventh month, when they normally separate. In cryptophthalmus this separation fails to occur and the lids retain in the adult the fœtal condition of closure. The line of fusion may be seen by the dimpling of the skin along the horizontal axis of the eye. The skin passes in an uninterrupted manner from the brow over the eyeball to the cheek. Lashes may or may not be present.

In some cases at least (Coover[3]), the fusion of the lids is accompanied by the defective growth of the eyeball, and by an imperfect or opaque cornea, so that operations designed to restore vision by opening the lids are futile. It is quite probable that the underlying factor is not the imperfect development of the lids, but of the eyeball, and that the lids fail to grow properly since they lack the normal stimulus of the perfectly developing eye. It is impossible to say which condition is dependent upon the other; it may be that both are equally dependent upon some common factor.

Photographs of Coover's cases are reproduced in Figs. 4 and 5. The points in the clinical

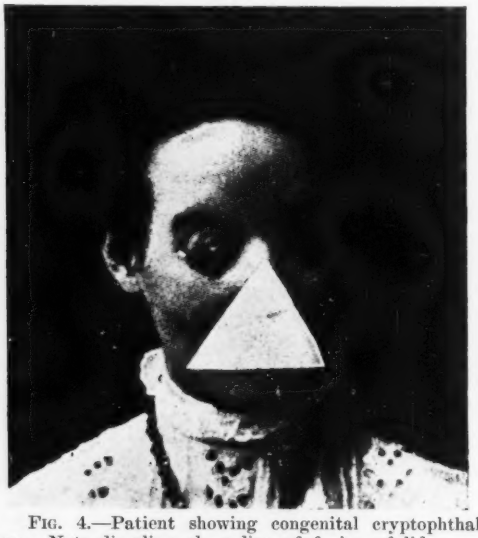

FIG. 4.—Patient showing congenital cryptophthalmus. Note dimpling along line of fusion of lids.

FIG. 5.—Daughter of woman shown in Fig. 4, showing the inheritance of the condition from her mother. (Figs. 4 and 5 after Coover).

description are well brought out here. There is a folding of the skin at the point where the lower lid joins the cheek, which conveys the impression that the lids are merely closed. The line of dimpled skin across the middle of the eye, however, shows the zone where upper and lower lids are fused. This woman, married to a man blinded through accident, gave birth to a child normal in every respect save that it duplicated its mother's deformity (Fig. 5). Although an operation was performed on both mother and child the abnormal eyeball prevented even a subnormal vision. The lids were reunited and the patients continued to be blind.*

Other cases of this affliction have been reported by von Hippel[9] in two sisters, and by Eberhardt[5] in two sisters. The parents of Eberhardt's patients were cousins, and both normal.

How can we explain such cases of inheritance? When a defect occurs in several children whose parents are normal, and when consanguinity of parents is occasionally found, the explanation is at once suggested that we are dealing with a recessive factor. Again referring to Table I we see that cryptophthalmus is comparable to blue eyes in its mode of transmission. Coover's case is explained by referring to Mating V, where a person possessing two recessive factors for the defect, and so, of course, showing it, was mated to a normal person, who carried one recessive factor for the defect latent. The two recessive factors, one from each parent, united to produce the condition of cryptophthalmus in the child. The pedigrees of von Hippel and Eberhardt are similar to the conditions found in Mating VI in which two normal parents, each with a recessive factor for the defect latent, mate, and produce a cryptophthalmic child.

How are we to know who has cryptophthalmus latent, and how could we advise patients who have this defect in their family? All that can be said is that those who actually show the defect should of course not produce children. Parents who are normal and have produced one cryptophthalmic child, should have no more offspring. Cousins who are each members of families where this defect has shown itself should not marry.

Minor defects of the lids.—Epicanthus, or the presence of a fold uniting the upper and lower lids at the inner angle of the eye, is inherited. It may be associated with other eye defects. It is the normal condition found in the Mongolian race and is responsible for the peculiar aspect of the lid slit in this people. Since it is a dominant character for which the Mongols are pure, it is inevitably present in all of their race. (see Mating I, Table I). It is of no significance in the production of blindness, although a family reported by Goldberg[7] exhibited it to such an extreme degree as to make free movements of the lids impossible.

Peters[16] records another minor defect, the presence of dark underlids caused by the dilated venules and a yellowish pigment beneath the skin. This had affected twenty persons through five generations and behaved like a dominant character.

Distichiasis or the presence of two rows of lashes on otherwise normal lids is inherited and is probably due to a dominant factor. Cases have been reported by Wood,[22] Koller,[11] Jeanselme and Morax,[10] Erdmann and Slutschewsky.[20] *Lack of eyelashes in father* and son was reported by Traquair.[21] *Relaxation of the lids* due to atrophy of the underlying connective tissue ran through four generations of a family, acting as a dominant character, Lafonde et Villemonde.[12] *Fat hernia* of lids has been recorded in a mother and daughter by Schmidt-Rimpler.[19]

Of the above defects only cryptophthalmus causes outspoken blindness, which is irremediable, plastic surgery being of no avail. Persons affected with this condition should of course refrain from having children. Ptosis and lagophthalmus may be so severe as to cause partial or total blindness. Operation is always needed to correct the severe cases, and it may not prove wholly satisfactory. It is impossible to predict the degree of severity of these conditions in the offspring on the basis of the amount of deformity in the parent. Hence persons suffering from the hereditary types of these defects should not reproduce. The other conditions mentioned are of importance mainly from the cosmetic point of view, and the patient may be advised regarding their hereditary character. From the

* Since that report, two other children have been born in this family. The second, a male, showed the same condition of cryptophthalmus that was present in the mother and older sister. The third child, a male, was normal.

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standpoint of the public, however, the transmission of these minor conditions is of no importance. With respect to the three major hereditary abnormalities of the eyelids, ptosis, lagophthalmus and cryptophthalmus, the patient and the public at large should be educated concerning the desirability of their total elimination from the community.

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OSTEITIS DEFORMANS (PAGET'S DISEASE)*

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THROUGH the courtesy of Doctors Conboy, F. C. Harrison, F. Arnold Clarkson and Gordon E. Campbell I am able to present to-night five cases of Paget's disease of the bone. It is just fifty years since Sir James Paget[1] described this disease, which bears his name. The etiology is as yet unknown. Paget considered that it was a chronic inflammation of bone. It has also been thought to be due to syphilitic or parasyphilitic disease, and changes have been found similar to those in tabes. The internal secretions have been considered at fault. Toxic causes have lately been considered as probably causing the pathologic lesions in this disease, the toxæmia arising from absorption of toxins from the intestinal tract continued over a period of years.[2]

The age at which this disease is seen is usually after forty, but as it is a long continued and slow disease it may have originated at the age of thirty or under. Little difference is seen between males and females, although four of the cases to-night are females.

The pathological changes consist of a change from normal bone structure to bone of a finely cancellous type. The bone is invaded by fibrous tissue—the result of chronic inflammation—and this tissue softens, rarefies, and absorbs the bone. The process is a slow one, and, coincident with this destruction, a process of regeneration and ossification occurs, although at a slower rate; so that, at this stage, the bones are softened and bending occurs. The normal curves are exaggerated and later new curvatures may develop. Finally, bone formation overtakes the absorption, and subperiosteal bone is also laid down; the resultant bone is thus larger, more porous and roughened on the surface.

The clinical features are pain, progressive

* Presented at the Academy of Medicine, Toronto, Surgical Section, November, 1925.

enlargement of the head, and bending of the bones. Pain is often the first complaint; it is constant, and not nocturnal, and is attributed by the patient to "rheumatism" or "neuritis." This was illustrated by the first patient, a woman of fifty-six, who complained of a severe pain, of several months' duration, in the right thigh and knee. Examination at first did not reveal any obvious lesion, but a closer attention to the thigh showed an enlargement of the bone. This was confirmed by a skiagraph, which also revealed the characteristic changes of Paget's disease beginning in this bone, and enabled the diagnosis to be made in an early stage of the disease.

The second case illustrates the progressive enlargement of the head, noticed by the patient when he finds he has to buy larger and larger hats. This patient procured a cap size eight, but had to have a two-inch gusset inserted before it would fit him.

FIG. 6.—Appearance of a patient (Case. No. 2) in an advanced stage. The curvature of the bones in arms and legs, the kyphotic spine, depth of chest antero-posteriorly, and the enlarged head can be noted.

Bending of the bones of the legs and arms is often the first symptom noted; the bending at first consisting of an exaggeration of the normal curves. One bone alone may be the site of this disease and may show this change, and examination over a long period of years may fail to discover any spread to other bones, although usually several bones are affected. The tibia, femur, humerus, and bones of the forearm are those most commonly affected.

Atheromatous changes are very constantly found in the arteries, and can be prominently seen in Fig. 3. Malignant changes also have been described. Out of thirty-four cases, thirteen developed malignant conditions, of which nine were primary sarcoma of bone.[3] Sarcoma is the growth commonly observed. Fractures are not uncommon complications, as is illustrated in Case No. 5. This woman suffered a fracture two years ago which has healed soundly, no evidence remaining in a recent x-ray. (See Fig. 5). She was known to have had Paget's disease for two years previous to the fracture.

The diagnosis seldom presents difficulty, but in the early stages of the disease, or where only one bone is affected it may not be easy. Acromegaly is distinguished by enlargement of the hands and feet, lips and facial features, while the bones are more dense and show enlarged ridges for muscular attachments. The x-ray is very valuable in diagnosis, and in three common conditions, rickets, syphilitic periostitis and osteitis deformans, the picture is characteristic. In the tibia, a frequent site of these

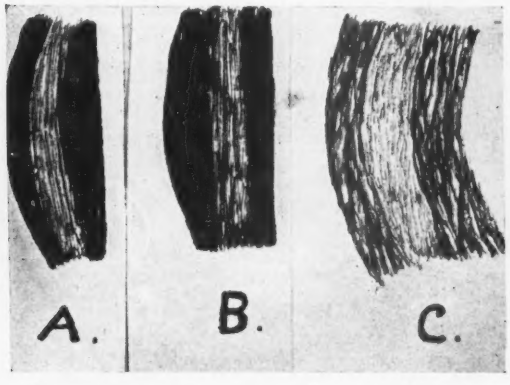

Diagram showing x-ray appearance of tibia in: (A) Rickets; (B) Syphilitic periostitis; (C) Paget's disease.

(A) Shows the curvature with anterior convexity due to a bending of the bone, the dense and cancellous bone easily differentiated. A buttress of compact bone is to be noted on the posterior surface adding strength to the bone.

(B) Shows the appearance of a tibia, the site of syphilitic periostitis, the curvature on the anterior subcutaneous surface being due to dense new subperiosteal bone.

(C) Shows the bending, widening and thickening of the whole bone. The dense and cancellous bone is not clearly differentiated, and in the dense bone is noted the presence of enlarged Haversian spaces.

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changes, a rachitic condition (A) shows an anterior curvature with a buttressing of new bone on the concave posterior surface as though to give strength to the softened and weakened bone. Syphilitic changes consist of a periostitis, and on the anterior convex surface a thick layer of new bone is laid down (B). In osteitis deformans (C) the whole bone is thickened, the sharp distinction between cancellous and compact bone is lost, and large Haversian spaces are seen running longitudinally.

Treatment is purely symptomatic and largely for the relief of pain; one of the present cases has been relieved by potassium iodide. For the bending and bowing of bones, rest and cessation of work is advisable during the stage when softening has occurred, and before the bone has become again firm. When the disease has progressed to a late stage and the bone is enlarged and strong again no measures are of any value nor need to be taken.

Case 1.—Mrs. B., aged fifty-six, married. Had good health until five years ago, when right breast was removed for carcinoma. One year ago began to suffer from pain in right thigh, which she thought was "rheumatic". Saw several doctors who prescribed, but little relief was afforded. A more severe attack brought her to hospital. Examination showed a scar of breast operation but no secondaries were discovered. Right femur noted thicker than left, and a skiagraph was ordered. This showed appearance seen in Fig. 1. Following this, an x-ray picture of the tibia and the skull was taken and these showed the typical features of osteitis deformans. Pain was the prominent and early symptom in this case.

FIG. 1.—This gives the appearance of the right femur of Case 1, showing thickening of the shaft as a whole, with loss of definition between the dense and cancellous bone, also enlarged Haversian spaces.

FIG. 2.—The appearance of the skull in Case 2, showing the increased thickness best seen in the area of the frontal bone. The frontal sinus shows distinctly and gives an idea of the amount of enlargement.

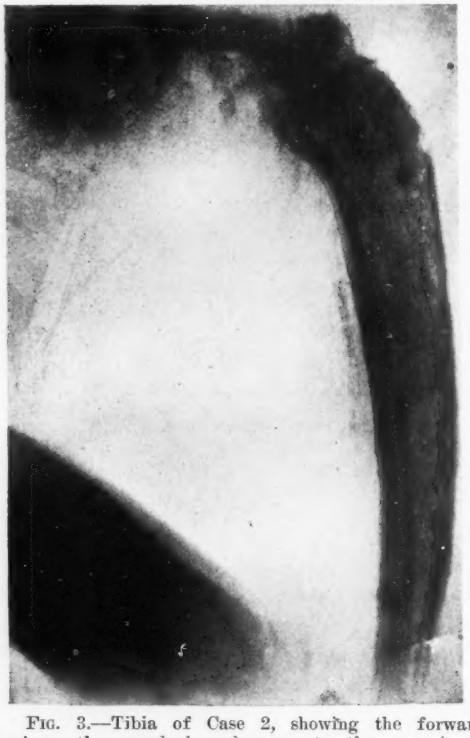

FIG. 3.—Tibia of Case 2, showing the forward bowing, the marked enlargement, the prominent Haversian spaces and the extreme degree of arteriosclerosis..

FIG. 4.—This shows the bones of the forearms in Case 3. The thickening and bowing are again apparent, also the loss of differentiation between the dense and the cancellous bone. The enlarged Haversian spaces running longitudinally are distinctly seen.

FIG. 5.—This plate shows the disease well marked in both tibiæ. The right tibia was fractured, but this has healed so that the site of fracture cannot be distinguished.

Case 2.—Mr. A., married, aged seventy-four. Has had Paget's disease for past fourteen years, and is a typical picture of an advanced case. Head is greatly enlarged and carried on a plane anterior to the rest of the body. Head is tilted upward to enable him to look forward. Cervical curvature is exaggerated. The arms and legs are greatly bowed and the back is kyphotic, giving the appearance of an ape. The arteries show marked arterio-sclerosis. Mental condition is bright. He himself attributes the disease to a fall from a wagon fifteen years ago when he was severely bruised but no bones fractured.

Case 3.—Mrs. M., married, aged fifty-four. Has suffered from this disease for six years, and shows an advanced stage. Is confined to bed most of the time. Head in this case markedly enlarged and bowing of the arms and forearms is especially marked. The femora and tibiæ also show great anterior bowing. Pain is much less a feature in this case.

Case 4.—Mrs. A., married, aged forty-eight. Has complained of painful right knee for the past five years, since she tripped crossing a car track and injured her right knee. She has complained of "rheumatism" in this knee ever since. Examination shows considerable thickening of the skull; frontal bosses prominent; Heberden's nodes on all fingers. Forearms show marked degree of bowing. Both femora bowed forward and laterally; tibiæ: right bowed forward and laterally, left bowed forward. Chemical investigations gave the following: Blood sugar, 116 mgms. per 100 c.c.; calcium (serum) 10.7 mgms.; phosphates inorganic as P. 4.8.

Case 5.—Mrs. W., married, aged forty-nine. First symptom noticed four years ago was pain in both tibiæ. Whilst walking on the street two years ago spontaneous fracture occurred in right tibia. This healed well. Wassermann negative. A skiagraph of tibia and fibula showed the presence of Paget's disease. For one year following fracture had relief from pain, but for the past year the condition has been more painful. Potassium iodide has given relief. A recent x-ray shows markedly thickened skull, femora slightly affected, but both tibiæ show the disease in a marked degree.

My thanks are due to Dr. Kruger who kindly took all the x-ray plates at the Toronto Western Hospital.

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Mr. John D. Rockefeller, Jr., has presented three and a half million francs to the University of Strasbourg for the enlargement of the ear and nose clinic and for the completion of various unfinished researches.—*Science Supplement*, Dec. 3, 1926.

A NOTE CONCERNING THE RADIOGRAPHIC DIFFERENTIATION BETWEEN DIPLOIC AND MENINGEAL VASCULAR CHANNELS

By I. Maclaren Thompson

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In a recent number of this *Journal*[2] two radiograms of a skull were published in which could be distinguished the grooves on the deep aspect of the vault which lodged the meningeal vessels and certain channels which contained diploic veins.

Through the kindness of Dr. L. H. McKim, the surgeon in charge of the case, and of Dr. W. L. Ritchie, radiologist to the Montreal General Hospital, I am enabled to publish herewith a radiogram of a living head (Fig. 1) in which the distinction between the meningeal and the diploic channels is most strikingly shown. In addition to the difference between their courses and positions, the broad, gently undulating diploic lines stand in very sharp contrast to the narrower, straighter, meningeal lines, many of which are seen to cross the former.

The diploic channels in this case are considerably broader than what one regards as normal; possibly they are instances of the large diploic veins postulated by Coen[1] as factors contributing to the erosion of the inner table of the skull by such veins. It seems impossible to determine from the radiogram whether or not this process has occurred in this individual.

Fig. 1.—Radiogram of living head showing unusually well marked diploic and meningeal vascular channels.

It may not be without interest, however, to record a few notes extracted from the clinical history, for which I have to thank Dr. McKim. The patient was a male, aged fifty-three, born in France and a painter by occupation. He fell on the curbstone, striking his head, but never lost consciousness. He came to the hospital exhibiting a sub-conjunctival hæmorrhage on the left side and bleeding from the nose and mouth. The official report of the radiologist read: "No evidence seen of any fracture or pathological bone change. The vessel markings here are exceptionally large." Under appropriate treatment he made a rapid recovery.

The interesting point about this history is that the patient sustained an injury to his head of a degree of violence (to judge from the orbital and nasal hæmorrhages) such as might be expected to produce a fracture had the cranial vault been eroded by the diploic vessels to the extent exhibited by the specimen previously described. So far as such extremely circumstantial evidence goes, the escape from fracture under these circumstances would seem to suggest that probably such erosion has not occurred.

Be that as it may, this radiogram appears to be worthy of publication inasmuch as it affords a striking demonstration of the possibility, in certain instances at any rate, of distinguishing radiographically between bony channels produced by diploic vessels and those due to meningeal vessels, not only in the dried skull, as in the specimen previously described, but in the living person.

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HEREDITARY HÆMORRHAGIC TELANGIECTASIA

By Hugh Mackay, M.D., and F. D. McKenty, M.D.

Winnipeg, Man.

Part I

UNDER this title several medical writers draw attention to a familial symptom-complex. The essential and distinctive features of this disorder are epistaxis of hereditary type which ordinarily appears early in life and recurs over an indefinite period, to be followed later on by telangiectasia, usually manifesting themselves in the skin of the face, the fingers, often under the nails, the mucous membrane of the mouth and the nose, the vermilion border of the lips and the mucous membrane of the tongue. These nævoid lesions are of three clinical types: hæmorrhagic pinpoints, spider nævi, and nodules which are usually elevated, one to five millimetres in diameter.

Fundamentally, the absence of muscular and elastic fibres from the walls of the superficial vessels furnishes the histological explanation for the persistent bleeding. Like all nævoid formations heredity lays the foundation of the abnormality, although the lesions themselves may not develop till mid-life or even later. The conjoined symptoms of epistaxis and telangiectasia are essential to establish the diagnosis in this obscure affection.

There can be no doubt that these conditions are more common than is ordinarily recognized and that they are not infrequently confused with hæmophilia or with the hæmorrhagic diathesis.

Medical literature contains reports of some thirty families afflicted with this distressing malady. The bleeding is generally spontaneous in origin, but trauma may be an exciting cause. Several fatalities from uncontrollable bleeding are recorded. Some of the records include four or five generations and altogether a total of about 200 cases have been collected. The incidence of the disease in males and females is about equal; both sexes are able to transmit the affection. The pathology furnishes the explanation of the futility of internal medication directed to the control of the hæmorrhage. The following case histories are appended.

Case 1.—Mrs. G., age forty-four, came under observation December 9, 1925, complaining of attacks of nasal hæmorrhage, recurring at frequent intervals during the past twelve years; at times the bleeding was alarming, necessitating plugging of the nostril on several occasions. The hæmorrhage bore no definite relationship to the menstrual period. The climacteric passed uneventfully at forty; the patient was never pregnant. The heart and blood pressure were normal. Microscopic examination of the blood made by Dr. Cadham revealed no departure from the standards of health. Submucous resection for nasal hæmorrhage was performed nine years ago with no betterment.

Fig. 1.—*Case 1.*—Mrs. G., hereditary hæmorrhagic telangiectasia.

Two years ago small hæmorrhagic spots began to appear on the face, on the lower lip and its vermilion border, on the tongue, and under the nails. A fine network of distended wavy radiating vessels of the spider nævoid type appeared on the cheeks. There has been no bleeding from these areas.

The patient's mother had a tumour of the bowel removed in 1918, pronounced malignant. Like her daughter, she also had recurring attacks of nasal hæmorrhage, sometimes requiring plugging of the nose, extending over a period of twelve years, with the development of "red spots" on the face, nose, lips, scalp and the hands. Some of the lesions in the scalp bled freely at intervals. This case history is confirmed regarding the hæmorrhage by her physician, Dr. H. M. Murdoff, who states that this patient bled excessively from the nose and lips, and

that this bleeding precipitated her demise. One of the patient's brothers, age forty-two, suffers from epistaxis which began in boyhood and reached its maximum intensity between the ages of twenty-five and thirty-five years. He likewise presents numerous hæmorrhagic points on the mucous membrane of the lower lip and on the tongue. There are in addition numerous spider nævi on the cheeks and a nodule ¾ c.m. in diameter on the left ala nasi. This case was checked up by both of us.

Another brother, age forty-eight, has been the victim of nasal hæmorrhage beginning in early life and increasing in intensity up to mid-life. We are unable to say whether the skin is involved or not. The patient's maternal grandmother died young, and there was no history in her case of hæmorrhages. The maternal great grandmother suffered severely from hæmorrhage of the nose.

Treatment.—December 9, 1925, radium applied topically; 25 mg. in 1 mm. brass, and rubber finger cot to each nostril; three-quarter hour exposure given; March 22, 1926, radium as before; one and one-half hours to each side of the nose. July 6, 1926, radium re-applied one and three-quarter hours to each nostril. Radium has had a very favourable influence on the nasal blood loss. We unreservedly recommend its more extended use for sufferers of this class.

Case 2.—Agnes W., age ten, August 20, 1926. Has a history of recurring attacks of nosebleed at intervals of about a week; the bleeding was not excessive. No history of trauma could be elicited. Three months ago noticed a punctiform vascular dilatation on the vermilion border of the lower lip, left side. This lesion began to bleed a month ago; the hæmorrhage was excessive, impelling the child's guardians to seek medical advice. The child is an adopted one. Accurate details of the family history are difficult to obtain. There is this single lesion on the mucous membrane of the lip without involvement of the skin. An examination of the nose was made by Dr. F. A. Macneil who reports little or no deviation from normal standards. Apparently this case falls under the same category.

Dr. McKenty will deal more specifically with the rhinological features in Case 1.

Part II

By F. D. McKenty, M.D.

This condition should be of great interest to rhinologists because of the associated epistaxis, but there appears to be very little regarding it in nose and throat literature. In C. F. T. East's review of the subject in the *Lancet* of this year, there is a list of references covering the period from 1865 to 1926; Chiari's report seems to be the only contribution from rhinological sources. In some text-books and journals, mention is made of hereditary or familial epistaxis and of nosebleed at the climacteric, but these do not appear to be associated with the characteristic vascular changes. Kyle describes under the name "telangiectoma", a definite tumour usually of the skin, but sometimes found in the nose, causing painful tension, relieved if hæmorrhage occurs. He quotes the cases of Osler, Brown-Kelly and Chiari, and emphasizes the familial feature, but the disease seems to be confused with hypertrophic angioma, a form of new growth seen occasionally in the nose, and described by Bakker as a red, soft, uneven swelling with occasional blood tinged discharge, but no true nosebleed.

The clearest description of this condition appears in the third edition of Moritz Schmidt's German text-book published in 1904, as follows: "Other tumours occurring in the nose are, true angioma and telangiectasia, *i.e.*, dark red, soft tumours growing only to the size of peas, which cause, either spontaneously or through touch, long continued bleeding. They occur also in the posterior part of the nose, and there they cause the most violent hæmorrhage, during which they cannot of course be diagnosed. In this position they are, however, not always visible; sometimes they become visible if the lower turbinate is pushed aside with a broad probe. One should not, however, use cocaine in this examination, as the telangiectases might temporarily disappear through contraction of the vessels. On the side of the tongue, especially at the point where the arcus-glossopalatinus joins the tongue, they sometimes reach the size of a small raspberry."

This condition in our case, differed from ordinary epistaxis in certain ways, which, while not obvious, were definite upon careful examination. In the bleeding area, it was difficult to recognize any distinct vessels. There was instead a fine mottling of red spots varying from a pinhead to a pinpoint in size.

Strong solutions of cocaine and adrenalin had very little effect on the hæmorrhage, so little that it was necessary to resort to persistent plugging of the nostril with cotton. The cautery seemed to increase the bleeding, rather than check it; at least until practically the whole of the affected area had been cauterized. Healing of the cauterized area took place more rapidly than in the usual case, but within two months the spots on the septum had reformed and bleeding recurred, and similar spots were noted on the lower turbinate and elsewhere. The condition was then recognized as some form of

nævus and the patient referred for radium treatment to Dr. Hugh Mackay, who identified it.

Examination of the deeper nasal cavities and naso-pharynx with the endoscope showed distinct nævus patches on the septum and anterior left lower turbinate, on the floor and the outer wall under the lower turbinate, and on the vault of the naso-pharynx, and one very distinctly marked spider nævus behind the posterior end of the right lower turbinate, seven centimetres from the nostril margin. These lesions corresponded in shape and size with those on skin and lips. The mucous membrane of the naso-pharynx bled slightly when gently rubbed with the smooth tip of the endoscope. This bleeding was more marked about the red patches, but could be produced anywhere more easily than in the normal naso-pharynx. There was an unusual amount of brownish sticky secretion present in both nasal cavities, but no evidence of localized sinus suppuration.

In the case of the younger brother of the first patient, examination showed a similar distribution of the lesions with a large and very typical spider nævus on the posterior lip of the right Eustachian tube.

Regarding the use of cocaine in examination, Moritz Schmidt warns against it on the ground that it tends to obliterate the spots and renders the diagnosis difficult. In these cases the effect was quite clearly the contrary; the normal mucous membrane was blanched, but the lesion itself was not changed, and stood out with increased contrast. It would seem, moreover, that this effect might be anticipated from our conception of the pathology of these lesions and of the action of cocaine on the dilator vasomotor fibres.

The effect of the radium treatment was definite. The hæmorrhage practically ceased, the mucous membrane of the septum in the region of its application became lighter in colour, and, the lesions noted on the left anterior turbinate disappeared entirely.

Summary

One may conclude from these cases, that:

1. The lesions of congenital hæmorrhagic telangiectasia may involve the mucous membrane of the whole of the nasal cavities and naso-pharynx. In cases of persistent epistaxis of obscure origin, the possibility of this condition should be kept in mind.

2. Cocaine should be useful in the diagnosis of nævoid lesions of mucous membrane.

3. Radium has shown a definite action in obliterating such lesions in the nose.

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Exhibition at the Science Museum at South Kensington.—The authorities of the Science Museum at South Kensington have arranged to hold periodical exhibitions for the purpose of bringing to the notice of the general public results of modern physical research, which would otherwise remain hidden from them in technical reports. The first of these exhibitions, according to the London *Times*, was opened on November 6. It consisted of apparatus and material illustrating work recently done at the National Physical Laboratory at Teddington in metallurgy, engineering and physics. Further exhibitions by other research institutions will follow at intervals of a few months, the plan being to change them about three times a year. Some of the research that was illustrated in the first exhibition bears on problems the importance of which has long been generally recognized. One of these is that of the protection of x-ray operators from the injurious effects produced by stray rays. The matter is undergoing investigation, and apparatus will be shown which is used to estimate the absorbing value of different materials. Apparatus has been constructed which first produces and then photographs sound waves within a small architectural model. These photographs show the passage of the sound waves and their reflection from irregular projections with the clearness of diagrams. A number of such photographs will be exhibited, together with a photograph of the special apparatus used for the purpose. Special hygrometers, designed to determine the amount of moisture in cold stores where the ordinary instruments can not be satisfactorily used, will be shown. There is also apparatus for ascertaining the rate at which heat is absorbed by different materials employed in connection with cold storage.

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RINGWORM OF THE HANDS AND FEET

By D. E. H. Cleveland, M.D., C.M.

Vancouver, B.C.

A SKIN disease which is very annoying, when not actually painful and disabling, and which is very frequently encountered, is the fungus infection variously referred to as eczematoid ringworm, ringworm of the hands and feet, and sometimes pompholyx. It is characterized by outbreaks of small vesicles in crops on various parts of the extremities, which are itchy, and accompanied by scaling, thickening and fissuring of the skin. It appears to be more common in spring and summer, and its true nature often is unrecognized.

History.—From that convenient scrap-heap and covering for diagnostic sins—eczema—distinct morbid entities are from time to time withdrawn and labelled. As Ormsby[1] says, "The present tendency is to exclude as rapidly as possible all forms of dermatitis which have a definite cause, and which upon removal of this cause disappear." Thus when in 1878 Tilbury Fox described a vesicular eruption confined to hands and feet, he believed it to be due to a dysfunction of the sweat-glands, and it was called pompholyx or dysidrosis. For long the possible parasitic origin of this disease was apparently not suspected, although the existence of infectious eczematoid conditions of hands and feet was recognized not many years later. In 1892 Djelaleddin Mouktar[2] described trichophyton infection producing thickening and cornification of the plantar and palmar epithelium. The organisms which he described in this connection were already known in connection with eruptions on other parts of the body: *Trichophyton violaceum, Trichophyton acuminatum,* etc.[3]

Turning back to 1857 we find Devergie[4] described an eruption in the groins under the name *herpés inguinal,* and made a drawing of the causative parasite which he described as a microsporon. Following this Hebra[5] in 1860 described the same eruption under the name eczema marginatum. During the next decade Köbner,[6] Pick,[7] and Kaposi[8] confirmed the presence of a fungus in preparations from similar lesions. The infectious nature of this disease having been recognized, it was accepted as merely a special localization of ordinary trichophytosis and for a time attracted little further attention. The significant fact that it did not attack the hair in this region apparently did not receive much consideration. In 1894 Sabouraud[9] succeeded in culturing the parasite of *eczema marginatum* and distinguished it from the trichophytons, classifying it as a species of the genus *epidermophyton—E. inguinale.*

Finally in 1910 Sabouraud demonstrated that the parasite causing the eczema marginatum of Hebra also gave rise to the eruption on the feet and hands with which this paper is concerned. He clearly distinguishes between this eruption and those in which Djelaleddin Mouktar[2] had previously reported the finding of a trichophyton. The pompholyx of Tilbury Fox is still described in the text-books of dermatology, but a view appears to be gaining ground, held strongly by such authorities as Darier[10] and Walker,[11] that pompholyx is a fungus infection in which the organism has eluded the efforts made to demonstrate it.

Clinical appearances.—The disease, known to dermatologists by the term epidermophytosis, appears commonly in one of three forms, although two or three of them may coexist in the same patient and even on the same extremity. The latent intertriginous form is mostly seen between the toes, where the interdigital spaces, particularly the two outer ones, are found lined with heaped-up, white, sodden-looking epithelium. As it becomes more acute, raw-looking glazed areas, sharply marginated, polycyclic or serpiginous in outline, with undermined epidermis at the edge, and frequently showing minute vesicles just beyond the edge, extend onto the surface of the toes and foot, especially the plantar surface. In the vesicular type groups of deep-seated vesicles, classically described as having the appearance of grains of boiled sago,

appear on the sole of the foot, especially beneath the plantar arch, or on the side beneath the internal malleolus. These vesicles arise on healthy skin and unless secondarily infected with pus-cocci show no erythematous halo. Intense itching commonly leads to their artificial rupture, followed by oozing of fluid, usually clear serum. Where exposed to friction and intermittent pressure as on the sole or palm, hyperkeratotic reaction produces thickening of the stratum corneum which at times is very pronounced, with extensive callosities.

The disease appears less frequently on the hands, and seldom without some accompanying infection of the foot, although I have seen this in the case of a man who was an attendant at a mental hospital where according to him the disease was common among the patients, whom it was his duty to bathe. It may cause such an unsightly appearance of the hands that it is not unusual for a patient to offer these parts for inspection and make no remark about the feet, although examination of them may disclose evidences of the disease there as well. A patient presenting eczematous hands should always evoke the physician's request to see the feet.

The eruption on the hands is less characteristic than that on the feet. Hyperkeratosis with fissuring is more frequent; the eruption is less often polymorphous—polymorphism being a characteristic of many other of the dermatitides usually called eczema—than in eczema; finally it should be remembered that the primary lesion is almost invariably a vesicle arising on healthy skin, and not an itchy erythematous patch. The intertriginous type is less common, but the vesicles are commonly seen on the opposed surfaces of the fingers, also on the ulnar border of the palm, the thenar and hypothenar eminences. The nails are frequently infected. In the acute stages they may be softened and distorted and become detached. In latent stages a brownish deposit is seen beneath the free edge of the nail or in the lateral nail-fold.

The subjective symptoms range from itching or burning, often intense, to a feeling of soreness and rawness, depending upon the extent of denudation and fissuring. In those with irritable nervous systems urticarial eruptions may sometimes be sympathetically induced upon other parts of the body. I have seen such an effect in small children in whom the rash upon the body subsided without treatment being directed to any parts but the feet.

Diagnosis.—The characteristic distribution on hands and feet gives the first clue to the diagnosis. Acute dermatitides with vesicular lesions confined to the hands are usually due to external irritants, as in many cases of industrial dermatitis, which more commonly involve the dorsum. Eczema in these locations when not parasitic resolves into one or other form of dermatitis due to external irritation. Scabies will not be found upon the feet in adults, and will not confine itself to the hands for long. Arsenical keratoses are usually accompanied by other signs of arsenicalism and give a history of prolonged medication. The keratotic changes of later syphilis are almost always unilateral. The scaly palmar and plantar syphilides do not usually itch, nor do they have the moist inflammatory appearance of patches of epidermophyton.

Pompholyx.—In admitting pompholyx to consideration in the differential diagnosis the question of its existence as a disease of non-mycotic origin is opened. If it be admitted that it is such it must be recalled that the proponents of this view concede its rarity, and the fact that many cases long regarded as pompholyx eventually were conclusively shown to be due to fungus. It is also noteworthy that the clinical description of pompholyx as usually given fits that of the disease now under discussion, that there do not appear to be any distinguishing characteristics for differentiating between the diseases clinically; that failure to find the fungus does not prove its absence;[11] and that the remedies recommended for pompholyx are mostly fungicides.

Greenbaum[12] bases his conclusions as to the existence of a true pompholyx on a series of cases which were microscopically and culturally negative, and also gave negative results when tested with inoculation, auto-inoculation and complement-fixation methods. Similar methods had given positive results when applied to known cases of trichophyton infection. However, for purposes of comparison one should take into consideration the modern attitude towards the etiology of psoriasis. After the most exhaustive studies giving results that one might think had eliminated decisively the parasitic factor, Schamberg[13] still declared himself unable to deny or affirm the truth of the parasitic hypothesis. It is also noteworthy that Tarantelli[14] in recent ex-

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periments in allergic manifestations following the intradermal injection of trichophyton extracts has shown that these are not specific. He obtained many positive reactions after injections of his antigen in non-mycotic cases, notably in cutaneous tuberculosis. It is to be especially remarked that in known trichophytosis he obtained negative results in all those cases in which the infection, like epidermophytosis, was superficial and confined to the glabrous skin.

Causative organisms.—The clinical appearance of the disease in the majority of cases is quite characteristic. Fungus can usually be found upon careful and patient search. The best method is to detach particles of the undermined epithelium at the advancing edge of the lesion, shave off deeper layers of hyperkeratotic lesions, or the tops of vesicles, invert them on a slide, cover with 20 per cent potassium hydrate and a coverglass and examine after thirty minutes to one hour.

The exact identity of the causative organism is not a matter of great importance to establish, either for diagnosis or treatment. It may be one of the species of the genus Epidermophyton —the *Epidermophyton cruris* of Castellani or *Epidermophyton inguinale* of Sabouraud, the latter being the organism causing Hebra's eczema marginatum. It is stated by some authorities that the *Trichophyton interdigitale* of Kaufman-Wolff is found more frequently than the two former species; thus it would seem that in this location we may have identical clinical appearances produced by either a trichophyton or an epidermophyton.[15] These organisms are human in origin. The mode of infection is usually through moist surfaces such as the floors of shower-baths, margins of swimming-pools, beaches and other places where barefooted persons congregate. The laity have indicated their cognizance of this by such popular terms as "'Y' itch," "bath-mat itch," or in the case of the infection in the genito-crural region—"jock-strap itch." Its prevalence in an aggravated form, commonly with secondary pyococcic infection among native laundrymen in Oriental countries has earned for it the local name of "dhobi-itch." It is believed to be transferred by them to their patrons through the medium of laundered clothing, and from piece to piece in the stagnant riverside pools where the washing is commonly done. Experimental proof of this is lacking.[16] Skin kept constantly moist by natural or artificial means predisposes to implantation of the infection, hence its frequent ascription to dysfunction of the sweat-glands, and its frequency among those whose occupation keeps their hands or feet wet.

While the disease is undoubtedly contagious it is remarkable how infrequently one encounters the infection existing simultaneously in two or more members of one household, even where no special precautions have been taken, due to ignorance of the infectious nature of the disease. Not uncommonly the disease remains for a long time confined to one foot only. The fungus evidently manifests some fastidiousness in its choice of a suitable soil.

Treatment.—As the causative organism flourishes within the deeper layers of the epithelium, and especially in the vesicles formed, the treatment must be like modern warfare, a combination of mechanical and chemical methods of attack. Prolonged soaking and the use of keratolytics such as salicylic acid, with friction sufficient to dislodge the heaped-up macerated stratum corneum, and to tear open the vesicles, are indispensable preliminaries. This may be followed by a fungicide. Iodine is sometimes useful, and the combination of salicylic and benzoic acids known as Whitfield's ointment is used so widely that it has become to be regarded as almost a specific.

In a recent paper Myers and Thienes[17] reported the successful use of an alcoholic solution of thymol and cinnamon oil in fungus infection of the hands of fruit-canners which originated from the skins of fruit handled. They had also found the preparation useful in certain cases of epidermophytosis. This recalls Manson's recommendation of tincture of the leaves of *Cassia alata* in dhobi-itch.[16] A colleague and myself have used the formula, working independently, on about twenty-five cases altogether, but without success in any.

As mentioned above, Whitfield's ointment is the standard remedy and despite many unfavourable reports still seems to hold its own. The usual formula calls for salicylic acid to the strength of 3 per cent, but it is commonly found ineffective until this is increased to three or four times this strength. Its virtue seems to lie principally in the salicylic acid, and this takes us back with emphasis to the importance of the

mechanical side of the attack. It is equally surprising and gratifying how some of the cases of the most formidable appearance yield promptly to Whitfield if the salicylic acid content is raised. In some recalcitrant cases I have found that Dubois'[18] ointment containing copper sulphate in 2 per cent strength has given excellent results.

A difficult feature to combat is the source of the infection. While a great many cases are exceedingly stubborn, others clear up quickly, only for the lesions to reappear in a few weeks or months. It is believed that the principal medium of reinfection is the footgear. It is therefore advisable that during treatment the patient should wear cheap cotton hosiery that can be frequently changed and boiled, or still better destroyed, and a pair of old shoes that may be destroyed later. It is recommended that the latter should be swabbed out with strong lysol solution periodically and dried thoroughly. After bathing, the feet should be dried on gauze which can be burned.

The infection shows a tendency to linger about the nails, showing a heaped-up brownish deposit beneath the free edge of the nail, or underneath the nail-fold. In stages of quiescence this is often overlooked and becomes the source of a fresh infection of the neighbouring skin. Chrysarobin in a suitable solvent is the most useful remedy in this situation, but occasionally the fungus is so well entrenched that only evulsion of the nail will serve.

Persistence on the part of both patient and physician is essential, and treatment must be vigorous and unremitting, with suitable changes of medication adapted to the situation and the stage of the disease, until several weeks after the last trace of activity—indicated by fresh outbreaks of vesicles—has disappeared. Occasional painting of the eroded interdigital areas with silver nitrate is useful. It is upon this pink surface exposed by removal of the overlying thickened epithelium that the fungus lives, and is most vulnerable. Soaking in potassium permanganate solution where there is marked hyperkeratosis is valuable. The Roentgen-ray is a very useful adjunct in most cases, but does not accomplish a cure by itself. Ultra-violet radiation is of no value practically, although theoretically it might succeed in killing off the fungus were the latter first fully exposed. It should hardly be necessary to add that as many of the remedies upon continuous use may cause irritation, their employment must usually be interrupted from time to time and replaced with a soothing application such as a bismuth cream or a zinc preparation.

The work of Burgess[19] and Cornbleet[20] has shown that the existence of pathogenic fungi on the skin of feet which are clinically normal is very rare. It may therefore be concluded that reappearance of an epidermomycosis after clinical cure indicates either that some focus of infection, probably about the nails, was not cleared up, that reinfection has taken place from clothing, in which cases recurrence would be early, or that a wholly new infection has taken place.

Prophylaxis. — While the infection is most commonly acquired by walking barefoot on wet floors and pavements as mentioned above, it appears that individual precautions whereby each individual frequenting such places guards his own skin is more likely to be successful than more general measures. Ormsby[21], mentions an attempt in athletic clubs to sterilize floors by scrubbing with strong soap, but does not report upon the results. This certainly is a measure which general sanitation demands, but should not be relied upon wholly.

Summary

Ringworm of the hands and feet is a common contagious disease causing varying degrees of disability.

Its nature very frequently escapes recognition and it is regarded and treated as dysidrosis or eczema.

The existence of dysidrosis or pompholyx as a distinct morbid entity of non-mycotic origin is open to grave doubt, the evidence being mostly against it.

The clinical appearance of epidermophytosis is described and the differential diagnosis discussed.

In treatment the mechanical methods play a very important part.

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SOME PITFALLS IN THE DIAGNOSIS OF INTUSSUSCEPTION*

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THE improvement that can be made in the diagnosis and management of a disease is nowhere better shown than in the records of the cases of intussusception treated in the Children's Hospital in the past twenty years. In the first five years it was most unusual for these patients to be admitted to hospital until they were almost moribund and it was rare indeed for them to recover. In the last five years, however, errors in diagnosis have become relatively infrequent and most of the patients have been sent into hospital early enough to ensure a high percentage of recoveries. This improvement has come almost solely from impressing on students the significance of the ordinary signs and symptoms of the disease, and the great importance of releasing the obstruction before fatal toxæmia develops. It cannot be emphasized too forcibly that intussusception is one of the most urgent surgical emergencies, and that its cure depends almost always on the early relief of the obstruction.

Before submitting the patient to operation, however, it will be well to remember that occasionally other pathological conditions give rise to symptoms and signs which closely simulate those of intussusception. The commonest of these is dysentery. In its ordinary form this disease, characterized as it is by high fever, diarrhœa and muco-purulent stools, shows little resemblance to intussusception; but frequently the infection is such that the stools are distinctly blood-stained and not unlike those of intussusception. I can recall at least twelve children suffering from this disease who were admitted to hospital for immediate operation in whom its true nature was disclosed by the more careful examination of the stools. In two instances, however, the error was not discovered until a laparotomy had been performed, and although the error was followed by no unfortunate results, it might have proved very serious.

The first patient was a child of two years of age who had been seized with abdominal pain and vomiting. Within a few hours she had become very ill with fever of 102 and diarrhœa with frequent blood-stained mucous stools. Examination of the abdomen revealed a short sausage-shaped tumour in the right hypochondrium which so closely simulated the tumour of intussusception that further investigation was considered unnecessary. At the operation the intestines were found to be normal and the tumour proved to be an enlarged floating kidney which had probably never caused a symptom.

The error in this case resulted from insufficient enquiry into the nature of the diarrhœa and from inadequate examination of the stool. A more careful investigation would have shown that the child was not suffering from intestinal obstruction as there was free passage of gas and fæcal material; and the stool, instead of the blood-stained mucus of intussusception was the typical muco-purulent stool of dysentery.

*Read before the Canadian Society for the Study of the Diseases of Childhood.

The second patient was a fat vigorous baby of seven months of age who had been seized with abdominal, pain and vomiting and later with tenesmus and blood-stained mucous stools. In this patient also, the physical examination demonstrated a sausage-shaped tumour extending across the abdomen just below the umbilicus. With never a suspicion that the patient was suffering from other than intussusception the surgeon opened the abdomen, and found that the tumour was the edge of an enormously swollen yellow liver. So astonished was he at his mistake in identifying the tumour that, with the liver in full view, he repeated the palpation of the abdomen, and even then the similarity of the tumour to that of an intussusception was so close that if he had not been able to see the liver he could not have realized its true nature. Further investigation showed that the error in diagnosis in this case, also could have been avoided by a more careful examination of the stools; they were the characteristic stools of dysentery.

The histories of these two patients show clearly the ease with which even experienced physicians and surgeons may fall into error and they demonstrate very forcibly the need for the careful investigation of the individual case. There is a tendency in hospital practice to reduce case-taking to rule-of-thumb methods and to make snap-shot diagnoses from such syndromes as sudden abdominal pain, bloody, mucous stools, and sausage-shaped tumour in the abdomen, without much thought of the exceptions. No doubt the impressing of such clinical pictures upon the minds of students does much to ease the load they have to carry, and in the case of the dull ones may prove useful in raising their averages in diagnosis; but for teachers and thoughtful students the method is very bad. Each symptom and sign of disease is deserving of careful consideration and if our investigations are carried out with a truly scientific spirit such flagrant errors as these will quickly disappear.

Occasionally intussusception is not accompanied by blood-stained stools, at any rate until late in the disease. This is particularly so in intussusception of the small intestine. In such cases the diagnosis is made chiefly on the evidence of intestinal obstruction and the presence of a characteristic tumour. Here again the possibility of error must be borne in mind as the symptoms of intestinal obstruction do not always indicate mechanical obstruction of the bowel, and the tumour which has been discovered may have nothing to do with the intestine.

Two such cases have occurred in the Children's Hospital. The first was a baby of fourteen months of age who had been seized with abdominal pain and vomiting, and in whom all efforts to produce a movement of the bowels had failed. Examination demonstrated a moderately distended abdomen which contained free fluid and a tumour about the size of a lemon in the right hypochondrium. No definite diagnosis was made but all who saw the child thought there was a mechanical obstruction of the bowel, probably an intussusception. When the abdomen was opened the tumour was found to be an enormously distended gallbladder; the intestines were normal. The gallbladder was opened and drained and the patient recovered. This case illustrates the remark that symptoms of obstruction may arise from other causes than mechanical interference with the intestine. It also shows the importance of carefully considering the physical characters of the tumour.

The second case was of such striking peculiarity that we reported it at once in the *American Journal of Diseases of Children*.* A child of two years of age was admitted to hospital with a history that twenty-four hours before he had been seized with agonizing abdominal pain and vomiting, and that all efforts to produce a bowel movement had been unsuccessful. His pain continued for eighteen hours and then suddenly ceased, and for six hours previous to admission to hospital he had been comparatively comfortable although the abdomen was still moderately distended and tender. Physical examination demonstrated a tumour about the thickness of one's thumb extending across the abdomen just above the level of the umbilicus. It was only slightly movable and seemed to be attached to the posterior abdominal wall. While a definite diagnosis could not be made, the possibility of intussusception appeared to be so strong that an exploratory operation was performed. When the abdomen was opened a quantity of blood-stained fluid escaped and the surgeon quickly discovered areas of fat-necrosis in the omentum. The tumour proved to be an inflamed hæmorrhagic pancreas. As no abnormality could be discovered in the gallbladder or bile-ducts and nothing else was seen that might account for the pancreatitis, the abdomen was closed with drain-

* *Am. J. Dis. Child.*, Chicago, Feb., 1924, xxvii, 192-194.

age of the general peritoneal cavity, and the retro-peritoneal space about the pancreas. Next day the patient vomited a roundworm. Based on reported cases of acute hæmorrhagic pancreatitis in childhood, in which roundworms were found at autopsy in the duct of Wirsung, we have concluded that the disease in this case was induced by a temporary obstruction of the ampulla of Vater by the head of the roundworm. In all probability the operation was quite unnecessary.

Physicians and surgeons who are familiar with the seriousness of intussusception need no urging to stir them to action in the face of the emergency. Prompt surgical interference may be expected to render one hundred per cent of recoveries and an occasional mistake in diagnosis resulting from over-enthusiasm for operative treatment may seem of little importance when considered along with the multitude of good results which have accrued from prompt action. The four cases I have reviewed, however, show clearly that other abdominal diseases may resemble intussusception very closely, and that a little more care in considering the history and the physical examination, and particularly in examining the tumour and the stool, may save an occasional patient from a useless and probably injurious operation.

ON THE USE OF IRON IN ANÆMIA

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THE entire question of the value of iron in anæmias generally, and particularly in the anæmias of early infancy, has of late been the subject of considerable experimental study, which tended to lead to the conclusion that this form of therapy in anæmia was quite useless. This idea culminated in the conclusion of Williamson and Etts[1] purporting to show that no form of iron was able to restore the number of erythrocytes to normal, when once anæmia developed. The work of Williamson and Etts was based on experiments in which animals were bled repeatedly, until a severe degree of anæmia resulted, and towards which the exhibition of iron was ineffective.

There is no necessity to doubt the value of these experiments, but it is essential to point out the want of similarity between an anæmia produced by trauma such as bleeding, and an anæmia produced by some hæmopoietic derangement, or by the absence from the diet of foods containing iron and other substances, or by what has been called "constitutional inferiority" of the hæmopoietic system, such as would obtain, for instance, in prematurely born infants, or in twins. In the one instance, we have to deal with a direct loss of blood, while in the other, we are concerned rather with a deficiency of the materials from which blood is manufactured. It is due chiefly to the work of Von Bunge that we appreciate two important points with reference to the production of some forms of anæmias in children. The first is that milk, in every other respect an ideal food, is extremely deficient in iron, and the second is that in order to compensate for this deficiency, healthy infants are born with iron stores in the spleen and liver sufficient to tide the infant over the period during which milk is the exclusive food. Von Bunge found that the livers and spleens of new born infants contained proportionately five or six times more iron than those of adults, and that these iron depots are deposited during the last month or two of fœtal life. It follows, therefore, from these observations, that if milk is fed as an exclusive food beyond the time that the iron deposits have been completely used up, that anæmia will develop, and that it must of necessity develop earlier in infants born before a sufficient deposit of iron has been laid down, namely premature infants, and frequently in twins.

No one who has had any experience with this form of anæmia can hold any views which tend to show that iron therapy is ineffective in such cases. It was not surprising, therefore, that lest the conclusions of Williamson and Etts should have a far reaching effect, the publication of their work was followed by a storm of righteous protest, notably from Whipple[2] and from Bass

and Enzer[3]. Whipple maintained that, even after prolonged bleeding, iron reserves may become so depleted that inorganic iron may be utilized by the organism, while Bass and Enzer cited clinical instances of sharp rises in hæmoglobin in anæmic children following the administration of saccharated carbonate of iron.

They particularly noted the case of negro identical twins, both with rickets, and with very severe anæmia, where iron was given to one, while the other was used as a control. The infant receiving the iron showed a rise of hæmoglobin from 30 per cent to 70 per cent within seven weeks, while in the control child, on an identical diet, and in identical surroundings, the hæmoglobin remained practically unaltered until, during severe infection, a transfusion became necessary in order to save the life of the child.

Clinicians with experience scarcely require the citation of such cases in order to convince them of the value of iron, at least in some forms of anæmia. Pædiatrists particularly are almost of one mind on this question, especially with reference to what is known as nutritional anæmia, which is so common in practice.

Recently, Hart, Steenbock, Elvehjem and Waddell[4] have shown that a similar type of nutritional anæmia can be produced in rabbits by feeding an exclusively milk diet. They found that ferric oxide alone will not bring the blood back to normal, though it will have some beneficial effect, but that when some organic substance not containing iron, such as alcoholic extract of cabbage leaves, cornmeal, or chlorophyll, which is free from iron, is added to the diet, the blood rapidly returns to normal. This means that in the manufacture of hæmoglobin, some organic constituent, in addition to iron, is essential.

Instances of anæmia associated with rickets, or the result of faulty diet, and their cure by the addition to the diet of vegetables and iron, are sufficiently well known to require nothing more than mere mention. It is, however, of particular interest to have the opportunity of citing a case of anæmia in an infant, which did not respond to iron, and which paralleled, in a striking manner, the observations of Williamson and Etts in their bleeding experiments.

Baby V., aged thirteen months, was the youngest of six children. He was born at term, the delivery was normal, the birth weight was approximately five pounds. On the second day after birth, the child passed a large quantity of blood from the bowel, so large, in fact, that he was practically bled white. No therapeutic measures were employed either to check the bleeding, or to replace the blood which had been lost. For a week following this hæmorrhage the child was unable to nurse, and was fed from a spoon. After this his strength returned, and he nursed for ten months. He was given practically every form of iron compound on the market, but finally was kept for a long time on syrup of hæmoglobin. At thirteen months, when I first saw him, he weighed nine pounds, eight ounces, the weight of a baby about six weeks of age. He was emaciated, practically blanched, neither the liver nor the spleen were enlarged. There was a loud blowing systolic murmur audible over the entire precordium. Mentally the child was quite bright, and reacted exactly as a child of a year should. The hæmoglobin was 20 per cent, the white blood corpuscles were 9400, and the red blood corpuscles 2,350,000. The diet consisted of milk, a little cereal, and a little beef juice. The child was admitted to hospital, had a transfusion of 100 c.c., of citrated blood from the father, which was given into the longitudinal sinus. Twelve hours after the transfusion, the hæmoglobin was 48 per cent, the red blood corpuscles 3,500,00 and the child's colour considerably improved. He was placed on a diet containing liver, beef juice, egg yolk, spinach, cereal, milk, orange juice, and cod liver oil, all of which he took well. Three days after he was admitted, he was transfused again, this time 100 c.c. were given into the peritoneal cavity, and the following day his red blood corpuscles were 4,000,000 and the hæmoglobin 60 per cent. He was sent home at the end of a week, and one month later had gained two pounds. The hæmoglobin was 85 per cent and the red blood corpuscles 5,150,000. The loud systolic murmur noted at the first examination had completely disappeared.

This case is interesting because it illustrates clinically the experimental observations of Williamson and Etts, which showed that iron is ineffective in the anæmias which are due to bleeding. In a case of such severity, transfusion was the most effective rapid measure that could have been employed. After the transfusion, the diet and other things have their place. No doubt on a proper diet, with abundant food iron, a gradual improvement would have been noted, but this would have been very slow indeed. Certainly iron alone, even organic iron, was quite ineffective.

The saying is attributed to Claude Bernard that there is no such thing as a wrong experiment, that whatever happens under given conditions is exactly what should have happened. The fault, therefore, lies not in the experiments, but in the conclusions which are derived from the experiments. The conclusions which we are justified in drawing from the experiments of Williamson and Etts are that iron alone is of no use in the anæmias which are due directly to loss of blood, and not that they are useless in all forms of anæmia. Had this been their conclusion, no one would have quarreled with them.

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It is important again to emphasize the results of the studies of Hart and his co-workers in the nutritional anæmias produced in rabbits, where the importance of the addition of substances other than iron, notably leafy vegetables and cereals, is emphasized, and it is also interesting in this connection to note that it has long been empirically the custom of pædiatrists to commence the feeding of vegetable and cereal long before the iron stores in the liver and spleen have been exhausted.

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CLEFT PALATE

A CLINICAL STUDY OF A METHOD FOR ITS TREATMENT*

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THERE are two schools of surgeons who treat cleft palate. The first comprises those who believe that if the cleft palate is complicated by a coincident hare lip, the lip should be operated on as early as possible and the cleft palate at a later date. Of the second school are those surgeons who believe that the palate should be operated on before the hare lip.

While we agree that there are many reasons why the lip should be closed first, and, perhaps, especially is this true, if this closure is preceded by that of the alveolar cleft as suggested recently by Vaughan,[1] it is our belief that it is best to abstain from closing the lip, until the palate has been treated to a conclusion. We suggest this because it is desirable to have as much room as possible in which to operate on the palate.

We have believed that the best operation for cleft palate is an open one. We usually employ the modification of the Langenbech operation practised by Mr. Berry and Mr. Legg. We have come to the conclusion that theoretically it is advisable to operate, if possible, about the time that the child is beginning to speak a few words; *i.e.* about the beginning of the second year. Nevertheless, does it not seem to be a pity to delay treatment, and by delaying allow of increasing difficulties, by the further development of deforming influences during the first twelve to fifteen months of the child's life? Because we felt this we first adopted the procedure of Brophy, expecting to utilize these early months by carrying out the suggestions made by him. We, however, have never been markedly successful with the technique of Brophy, yet do not attribute our failures to this procedure. More likely our lack of enthusiasm about this operation is due to the fact that we do not receive our patients as early as desirable—when the alveolar processes and the maxillæ are soft enough to complete the operation at one sitting. We have experienced extraordinary difficulty in approximating the edges of the cleft in the patients presented to us. We have not been able to appose by pressure exerted on the separated edges of the cleft. We have not been able to depend upon the tensile strength of any wire to further the correction we were able to get by manual pressure. We therefore tried strong paraffined silk as a substitute for wire. With this we could exert greater tension, but were disturbed by an early eruption of the teeth following almost immediately its use.

It was then, only, that other means were sought by the writer to secure apposition of the edges of the palatal cleft. The writer suggested the use of threaded wires carried from side to side through both alveolar processes or the bodies of the superior maxillæ to maintain by tension pressure on the external surfaces of the

* Presented before the American College of Surgeons, Montreal, October, 1926.

alveolar processes through plates somewhat similar to those of Brophy. The writer suggested that Dr. R. Breitman, his assistant, should discuss the fashioning of such threaded wires with Dr. A. D. Angus, one of our dental officers. He, the latter, then with my associate, Dr. H. R. Derome, have united with the writer in an endeavour to develop a method for the rédressement of this deformity. This method is based not only on the anatomy of the parts affected but on their development. At birth and during infancy the diameter of the upper jaw is greater in an anterior-posterior than in a vertical direction, whereas in an adult the vertical direction is greater. The aim of those who would treat a cleft palate must be to remould the upper jaw so that its vertical diameter is increased at the expense of its anterior-posterior and lateral diameters.

If we examine what we might call the roof of the mouth, included in which are the hard and soft palates, the maxillæ, premaxillæ and alveolar processes, we cannot help feeling that the whole may be pictured in the form of a horseshoe. Further, we note that in cleft palates it will be necessary to approximate the lateral parts of this horseshoe without causing a protrusion forward of the anterior parts, which in the living case are represented principally by the premaxillary bones, but also by the anterior cornua of the superior maxillary bones.

If it were possible to deal with this as we deal with a horseshoe the problem would be simple, but when we deal with living tissues the mechanical problem is an extraordinarily difficult one, because there is no fixed point for pressure anteriorly. This fact would suggest tension exerted between the anterior and posterior parts of the opposite alveolar processes or bodies of the superior maxillæ. Theoretically this tension should be in the direction of the limbs of the cross of St. Andrew. The limbs of this cross should run from a position posterior to each canine tooth, to a position anterior to the last tricuspid tooth of the other side and cross about the middle of the cleft in the palate. This method, however, seems to be impracticable because it would cause too much injury to the unerupted teeth and the alveolar processes. Yet we must insist upon the importance of exerting pressure or tension to mould backwards and inwards our horseshoe shaped roof of the mouth, so that through this moulding, the edges of the cleft may be approximated with as little deformity as possible.

If the writer may omit details our technique may be thus described:

A plaster model of the alveolar processes and the cleft is made by the dentist. With this before us it is easy to plan our campaign, and there has been no difficulty in moulding plates of German silver on the external surfaces of this model of the alveolar processes. These we superadd to Brophy's lead plates and on them we exert careful pressure both manually and by tightening nuts applied to the free ends of two threaded wires which we insert as already mentioned. We consider these as forming a fixed point from which tension may be exerted on the anterior and lateral parts of the alveolar processes and bodies of the superior maxillæ that the premaxillæ and anterior cornua of the superior maxillæ may be drawn backwards and inwards by wires carried beneath the soft parts for the purpose of remoulding the maxillæ and premaxillæ into a position of normality. This anterior wire which is carried from lateral plate to lateral plate may be used in conjunction with a third plate which lies over the anterior surface of the premaxillary bones. We consider that the tensile pressure exerted by this last wire is of greater importance than the pressure on the lateral plates, but the pressure exerted by both plates and wires are interdependent. The tension exerted by the anterior wire has been the aim of others and especially the aim of Brophy and Risdon, who, in a personal communication[2] insisted upon its use.

Our Dr. C. M. Kirk has suggested that this antero-lateral moulding might be performed by fashioning our plates after the method of such a clamp as is used in the fixing of a nozzle to a hose, and bringing these together on the anterior surfaces by a screw used in exactly the same way as it is used on the hose. We have had these plates prepared only in one case. As yet we are not able to proclaim their superiority over the method used in the majority of our cases, although we accept the superiority of pressure made by screw instead of wire.

We are not yet satisfied that it is possible to secure apposition of the edges of the cleft at one sitting. We feel that this depends, among other things, on the age of the patient. We urge

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those who would try this procedure to insert the threaded wires, which are to exert tension on the plates, as high as the anatomy of the parts will allow, and we insist that the remedial forces (pressure) must be exerted both anteriorly and laterally if we hope to attain the normal crescentic contour of the upper jaw.

This method was discussed at some length by many of those who visited the wards of the children's hospitals associated with McGill University during the recent congress of the American College of Surgeons held in Montreal. Many of its faults have been laid bare. Is there, however, any perfect operative procedure for the relief of the most distressing deformity of cleft palate, and is there anything new under the sun[3]?

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Preliminary Report of Committee on Education Approved by Council on Physical Therapy of American Medical Association.—Such educational opportunities as are necessary to teach the proper practice of the various methods of physical therapy may be divided into three heads: (1) premedical school courses; (2) courses in medical schools; and (3) courses of information for the practising physician. Premedical Courses: The committee believes that courses in biologic physics should be added to the curriculums of premedical schools. This recommendation is in agreement with a similar recommendation made several years ago by a committee of the National Research Council. The committee realizes that this will be a slow process, owing to the lack of properly qualified instructors. While the selection of the subject matter for courses in biologic physics must always be made by the men responsible for such courses, the Council on Physical Therapy will be glad to act in an advisory capacity in laying out the broad outlines of the courses. The chairman of the Committee on Education has already received a request for such advice from a state university. As the courses in biologic physics are concerned with the application of physical principles to biologic problems, greater emphasis should be placed on the biologic needs than on the physical side of the subject. The instructor should have, therefore, a broad knowledge of the biologic phenomena that may be attacked through physical methods. He should be primarily a trained biologist rather than a trained physicist. Courses in physics naturally are planned and taught by physicists, who usually look on this subject as a branch of applied mathematics. They are interested in training students to make physics their life work. Great emphasis is placed on the exactness of the methods of physical investigation. It would be highly advantageous to the students and to the department, if, in the regular physics courses, physical principles were more frequently illustrated by biologic material. The biologically minded student might have a different attitude toward physics if he realized that many of the fundamental principles in physics were discovered and elaborated by biologists for use in their biologic investigations, and that, as a result of these contributions, many biologists have been inscribed in the history of science as physicists. Medical Courses: The courses in the medical school should be open to upper classmen and graduate students, and should be given by men who are familiar with physical principles, but whose primary interest is in therapeutic applications. The courses would best be given in connection with hospital clinics. Courses for Practitioners: Information for practising physicians could be given first by a series of carefully prepared articles published in the current scientific magazines, and second, by encouraging the presentation of papers on physical therapeutic topics before medical societies. They should not be of the usual case-report type, nor should their content be a summary of contributions to the progress of medicine. The purpose of the papers should be a purely educational one.—*J. Am. M. Ass.*, Nov. 20, 1926.

Case Reports

A CASE OF PERFORATED PEPTIC ULCER OF MECKEL'S DIVERTICULUM*

By A. I. McCalla, M.B.

Calgary

The case report that is being presented today is one of perforated peptic ulcer of Meckel's diverticulum. After giving you the history and the outcome of the case, I want to say a few words about the condition.

A boy, M.B.W., was first seen on October 17, 1925. He was three years and ten months of age. The following history was obtained. When fourteen months old he had a hæmorrhage from the bowel. It was moderately severe. One year later he had a second hæmorrhage. In May, 1925, that is fifteen months later, bleeding again occurred, the blood having the same character as before, not typically changed blood, but slightly reddish in colour. In September 1925, he had his fourth hæmorrhage. After the first three attacks he picked up rapidly, but following the last he did not gain as before and had been vomiting occasionally. His mother stated that he had always complained of slight abdominal pain, but never of a severe character. The abdominal pain had been worse since the last hæmorrhage. He had had since infancy, four or five loose bowel movements each day.

Here we have a boy nearly four years old, whose only history is bleeding from the rectum at rather long intervals. At other times he was perfectly normal with the exception of slight abdominal pain.

Examination showed a very pale anæmic-looking child. Temperature was 98.4° F, pulse 120, nutrition poor. Tonsils were septic and there was slight general glandular enlargement. A soft blowing murmur was heard over the base of the heart. The abdominal examination was negative and no pathological condition could be made out by rectal examination.

The blood picture was as follows: red blood cells, 2,800,000; white blood cells, 16,400; hæmoglobin, 35 per cent; smears, polymorphonuclears, 75 per cent; lymphocytes, 25 per cent; The reds were typical of a secondary anæmia. The urine was normal.

He was admitted to hospital and given 400 c.c. of citrated blood intravenously. His response to the transfusion was very rapid and he left the hospital in good condition. At this time a tentative diagnosis of tumour of the bowel was made, possibly a polyp.

He reported again on April 9, 1926. He had had no more bleeding and was the picture of health. *X*-ray examination of the gastro-intestinal tract was negative. It was still thought that the most probable diagnosis was tumour of the bowel, but operation was not sufficiently urged and he was taken home.

For the following part of his history I am indebted to Dr. R. E. Buswell of High River. From April 14th to August 14th, he was well and active. He did complain occasionally of slight abdominal pain, but this was of such a transitory nature that the parents thought nothing of it. This in spite of the fact that they were watching him carefully, so the pain must have been very mild indeed. On August 14th, he played harder than usual and was exceptionally well. During the night he awoke screaming with pain in the abdomen. This lasted about one hour, then became less severe, but he was very restless. He sank rapidly and died Sunday morning, August 15th.

The following is the report of the partial autopsy performed by Dr. Buswell and he very kindly sent the specimen for examination.

Autopsy report.—The right side of the abdomen was already badly discoloured. I made a median opening and on getting through the skin found the underlying tissues extravasated with old blood. I explored to find where this was coming from and found an opening in the right rectus muscle, filled with clot. I removed this and at once noticed an escape of gas.

I now went through the median incision and found the bowel adherent to the abdominal wall over the point where the wall had given way. I loosened the bowel from the wall and pulled it out so I could see it. I found a very interesting condition. On the ileum, about thirty-six inches from the caecum was a large diverticulum, and

* Read at annual meeting of Alberta Medical Association, September 15, 1926.

on the side of the ileum opposite this was a large perforated ulcer. This, I think, had been perforated for some time, and had been kept closed by its firm adhesion to the abdominal wall.

In the gross, the specimen resembled a miniature stomach, the ulcer being situated at the junction of the normal ileum and the diverticulum. Sections at this point showed normal small bowel mucosa on the one hand, and gastric mucosa with glands on the other. Sections taken at various parts through the body of the diverticulum showed gastric mucosa. Judging from the gross appearance and the microscopical preparations, it is probable that the whole interior of the pouch is lined by gastric mucosa.

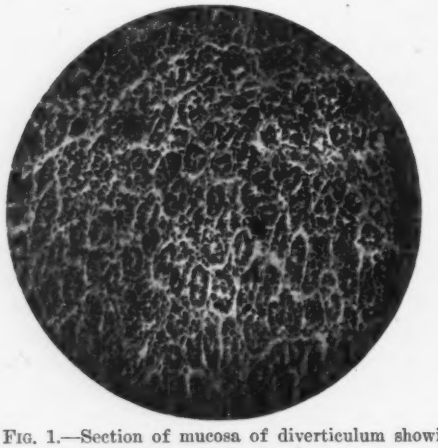

FIG. 1.—Section of mucosa of diverticulum showing gastric type of mucous membrane; low power.

Up to the present time there have been reported, as far as could be found, only fifteen cases of this condition, including two reported by Stultz and Waringer of Strasbourg.* In this article they have synopsized the previous thirteen cases. It is largely on the study of these cases, and on the case reported now that the following picture of the disease is based.

The clinical picture is fairly definite, and there is a marked similarity in each case. Bleeding from the bowel in a male infant, or child is the outstanding feature. There may be one profuse hæmorrhage followed by recovery, or the bleeding may continue off and on for some weeks, so that the child becomes almost exsanguinated. If the bleeding stops, a rapid recovery is made. There is usually some history of abdominal pain. It may be so mild as to attract little attention as in the case reported, or it may be very severe and of a colicky nature. The pain does not seem to have any definite relationship to the time of bleeding. This history of bleeding from the bowel with abdominal pain may continue for some years, as in one case reported by Pascale of Naples. The man was forty-one years of age, and had had frequent bloody stools accompanied by abdominal pain. On the other hand, there may be only one attack. In either case, if the condition is not recognized and an operation performed, sooner or later the ulcer perforates, and a general peritonitis ensues, or a localized abscess forms in the general peritoneal cavity, or in the abdominal wall. General diffuse peritonitis occurred in eight out of the fifteen cases. In three there was a localized abscess, and four only recovered as the result of operation.

* *Ann. Surg.*, Phila., lxxxiii, No. 4.

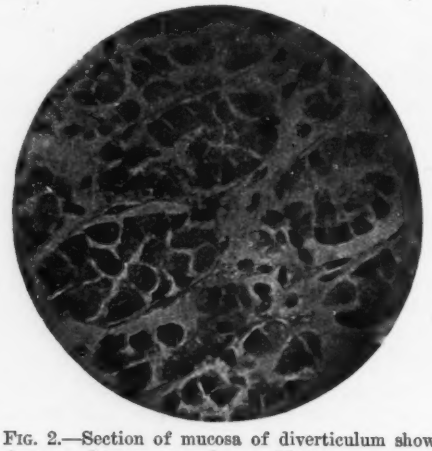

FIG. 2.—Section of mucosa of diverticulum showing gastric type of mucous membrane; high power.

As has been stated before, the two outstanding features of the disease are hæmorrhage from the bowel and perforation. The same is true of peptic ulcer of the stomach or duodenum. The symptoms in each case are based on a similar histology and pathology.

On account of the very serious prognosis in unoperated cases, it is most important to make a diagnosis early. Profuse bleeding from the rectum in a male child (every case reported has occurred in a male) in which no satisfactory cause can be found, should be regarded with the utmost suspicion. Abdominal pain in some degree is almost always present. In only one case was there no hæmorrhage.

In making a differential diagnosis the following conditions must be kept in mind:

1. *Intussusception.* The amount of blood passed is usually small and mixed with mucus. The initial severe pain and shock of intussusception is lacking in ulcer. On rectal examination the

head of the invaginating mass may be palpated, and on abdominal examination a tumour may be felt. Until the advent of peritonitis or abscess formation the examination of the abdomen is negative in ulcer.

2. In *Henoch's Purpura*, it may be difficult to make a diagnosis in the absence of purpuric spots or other evidences of the disease. Little or no blood may be passed in Henoch's, and there is usually mucus mixed with blood, and also more severe colicky pain. If the condition be kept in mind a diagnosis can usually be made.

3. *Melaena neonatorum* occurrs in infants before the possibility of ulcer has arisen at all.

4. In *infective dysentery* the patient is more acutely ill with fever and rapid pulse; and the frequent stools mixed with mucus and blood, in the one case, compared with the large quantity of blood passed without apparent cause in the other, should make the diagnosis easy.

5. In the case of a *tumour of the bowel* it may be impossible to make a diagnosis without operation.

The *Treatment* is entirely surgical. As soon as a diagnosis is made, an operation should be done. Transfusion may be necessary both before and after operation, but the tendency to perforate is so great that delay may mean the additional peril of peritonitis. If the patient's condition permits, the diverticulum should be excised. If not, some temporary procedure must be done and the operation completed when the patient is strong enough.

The pathology of the condition is most interesting. Meckel's diverticulum is the remains of the vitelline duct, that structure joining the yolk-sac and the primitive intestine. Normally, it is completely obliterated, but in about two per cent of subjects it persists forming a blind pouch of varying size and shape, coming off the ilium from 30 to 90 cm. above the ileocaecal junction. In the majority of cases the pathology of this vestige is the same as that of the appendix. It may become acutely inflamed; it may perforate; it may cause obstruction by bands, and it may be the head of an intussusception. In what is estimated at twelve per cent of all the cases, the diverticulum is lined, either wholly or in part, by gastric mucosa. It is in these cases, that peptic ulcers develop and they do so at the junction of the gastric and iliac mucosa. The pathological lesion is now the same as that of peptic ulcer of the stomach. Every case reported that has been subjected to microscopical examination has shown the same findings. The diverticulum acts as a stomach, secreting acid. The contents of the small bowel are alkaline and the ulcer forms at the junction of these two.

The references to this condition are not numerous and are largely in foreign periodicals, to which access has been impossible. This case has been reported in the hope of stimulating interest in this very serious and fatal disease. It may be that a symptomatology may be built up, which will allow the disease to be diagnosed before hæmorrhage and perforation occur. It would be most instructive to have all diverticula, removed for whatever cause, subjected to very thorough microscopical examination. It may be that some of the cases diagnosed as acute infective perforation of the diverticulum would turn out to be peptic ulcer.

I wish to thank the Pathological Department of the University of Edmonton Medical School for preparing the photomicrographs.

SPINDLE CELL SARCOMA OF THE PROSTATE*

By Doctors Sarjeant, Hicks, Knight and Harris

Brantford Clinic, Brantford, Ont.

The history of trauma as an exciting cause, the rarity of the condition and the result of treatment by surgery followed by radiation make the following case of sarcoma of the prostate of interest.

Doctor Sarjeant reports the clinical history as follows:

The patient, B. VanE., was a well developed, fairly well nourished boy, age sixteen years. He was first seen September 10, 1925, complaining of acute retention and pain over the symphysis pubis, preceded by scalding micturition for the two or three previous days. No history of chills or fever or pain in the back was admitted, but he gave the history of a fall out of a hay mow two months previously and of alighting on his sacrum. He was able to walk home, but that evening cried with pain in the lower sacral region. The next day he was better and had no symptoms until the present time.

Examination showed the bladder distended halfway to the umbilicus and tender on palpa-

* Presented at the October staff meeting of the Brantford General Hospital

tion. Rectal examination revealed a prostatic enlargement the size of a lemon. It was firm and rubbery and not very tender. His temperature was 98° F.; the pulse 72. The catheterized urine, one quart in quantity, was cloudy and alkaline; its specific gravity was 1020 and it showed a trace of albumin and an occasional white blood cell.

He continued to have acute retention and had to be regularly catheterized. Soon after the catheterization he was able to void one-half an ounce of urine, but as the bladder became full and distended he had pain when trying to void, and could only pass a few drops. At first a large rubber catheter could be passed easily but by September 13th, three days later, neither a soft rubber catheter No. 16 nor a flexible metal catheter could be inserted, and the attempt was very painful. Finally, the urine was obtained with a small soft rubber catheter but it could be inserted just past the sphincter and no further. Examination of the tumour by rectum showed definite increase in size and no change in consistency. A diagnosis of probable sarcoma of the prostate was made and the patient was admitted to Brantford General Hospital, September 18, 1925. A rectal examination on the 19th revealed a tumour the size of a lemon and of elastic consistency on the left side of the prostate; the rectal vessels generally were slightly engorged.

On cystoscopic examination, by Dr. E. S. Hicks, the bladder walls were seen to show no inflammation; the right ureteral opening was normal, the left opening was pouting. By pushing on the tumour per rectum a definite shelving could be seen on the left side of the bladder. The bladder wall did not appear to be adherent to the tumour.

On that account a perineal operation following the lines of Young's perineal prostatectomy was performed by Dr. Hicks on September 22nd, Dr. Sarjeant and Dr. Harris assisting. The tumour was very easily enucleated *en masse.* It was in two attached sections, the smaller representing the involved left lobe of the prostate; the larger representing the tumour as it had developed in the plane of least resistance. The tumour was of yellow colour and of firm consistency and had a very poor blood supply. The wound was packed with acriflavine gauze pending the pathological report. The reports from Dr. Luney of the Public Health Institute, London, and from the Buffalo City Hospital confirmed our diagnosis of sarcoma of the spindle cell variety.

September 26th, the acriflavine gauze was removed and radium needles were inserted giving a dosage of 2,400 milligram hours.

October 13th, Doctor R. W. Knight gave patient deep therapy treatment, 180 kilovolts and 50 cm. distance, 4 milliamperes for one hour over the perineum.

October 14th, the patient was discharged from hospital. The wound was almost closed, but there was still a slight escape of urine from it; most of the urine was passed by the urethra with very good sphincter control. There was slight frequency of micturition and rectal examination showed no recurrence of the prostatic tumour. The bowels moved normally. A month later the wound was closed and everything apparently was normal. The boy was able to be up and about and do light work, and continued to feel well for about three months.

November 7th, deep therapy repeated for one hour. Patient at this date looked well and had gained flesh to a marked degree.

Doctor Sarjeant continues the clinical history:

February 3, 1926: His mother reported that he had a cold, and the "grippe" lasting ten days with pains all over the body; these had now settled in his left leg, causing stiffness and difficulty in walking. He had to lie with the left leg drawn up in order to get to sleep at night. He was seen on February 11th, complaining of feeling languid and wanting to lie down most of the time; he had no appetite and was constipated. The pains in the legs were severe at times, particularly in the left hip, knee and foot. He had a bad taste in the mouth, and a sticky secretion on lips and teeth; at times he felt nauseated. Examination showed chest and abdomen negative, temperature 98° F., pulse 108. Rectal examination revealed a hard tumour reforming in the prostatic site, of the size of a small lemon and somewhat tender.

February 18th: Very constipated, and had difficulty in voiding urine yesterday, passing

only bright red blood. This morning he passed a few clots and only three ounces of urine. He complains of pains in the calves of the legs, and appears very worried and nervous. No appetite. Pulse 120. Examination revealed slight tenderness and a sense of resistance on palpation just over the symphysis, and low down on left side. Bladder was not markedly distended. Rectal examination shows the tumour to be larger than a week ago and extending more to left side; it is stony hard and tender.

February 19th, acute retention of urine. Catheterized with difficulty, using finally a metal catheter after which a soft rubber catheter was inserted and strapped in with adhesive. About one quart of dark red bloody urine obtained.

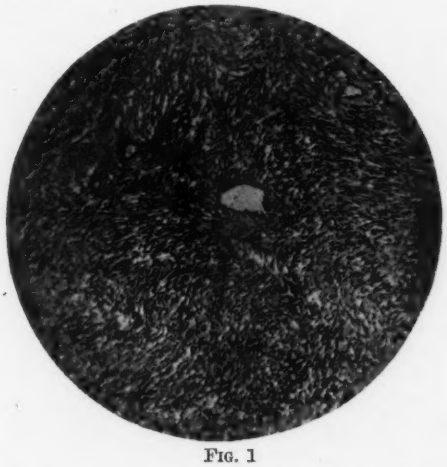

FIG. 1

February 20th, slept very little all night, complaining of headache and pain behind the left eye causing him to cry and groan. At 6 a.m. had a convulsion apparently uræmic, after which he was blind and remained in a restless delirium, not recognizing anyone and not answering questions, crying out with pain and throwing himself around the bed. Very irritable, resisting even the touch of a drinking cup to his lips. Another convulsion occurred at 6 p.m. Restless delirium; crying and groaning and refusing to take water or nourishment. This continued for two days until early morning February 22nd when he suddenly became quiet, recognized the voice of his mother and attendants but was unable to see them. Eyes staring and bulging. Pupils small, no reaction to light. Pulse 134 and much weaker.

February 23rd, taking fluids and resting comfortably except for some pain in legs. Sight has returned and is apparently normal. Urine still draining by retained catheter in considerable quantity. No paralysis of legs but marked atrophy of muscles particularly of left leg. Absence of knee jerks and ankle jerks. Sensation normal.

FIG. 2

FIG. 3

March 2nd, patient very drowsy and weak and becoming very emaciated. For past few days urine coming per catheter has been very thick and foul smelling. To-day no urine per catheter, bladder distended and painful. Catheter inserted two inches further before urine

could be reached. Distended bladder occupied right side of pelvis; when emptied the tumour could be felt extending up into abdomen on left side just above pubis.

Patient became gradually comatose and died on March 4, 1926, approximately six months after first symptoms appeared.

We are appending three microphotographs kindly furnished us by Dr. Luney of the Public Health Institute, London.

From the literature at our command it would appear that eighty-four previous cases have been reported. We are indebted to Doctor Parmenter of Buffalo who made the first complete review of sarcoma of the prostate, for reprints of his paper and for advice generally. Recent papers of Doctor Bumpus of the Mayo Clinic, Doctor Culver of Chicago, and Doctors Smith and Torgenson of Grand Rapids bring the statistics down to date. The spindle cell type constitutes about 20 per cent of these tumours, the round celled about 40 per cent.

The clinical symptoms of sudden retention of urine, pain and a palpable prostatic tumour in a young patient should lead one to think of prostatic sarcoma. The diagnosis in patients past forty years of age will be made only after pathological examination. While clinically in children abscess, tuberculosis and hæmatoma would be the only possibilities, in adults the possibilities are very many and the diagnosis clinically almost impossible.

We believe from a study of the literature and our experience in this case: (1) That any operative interference should be by the perineal route. (2) That surgical measures are justified for immediate relief especially if combined with radiation. (3) That surgery is justifiable as it affords the opportunity for placing radium effectively. (4) That to radiation and not to surgery should be credited the six months' extension of life in this patient.

DERMATITIS VEGETANS
(Report of a Case)

By John Christie, M.D.

Vancouver, B.C.

A survey of text-books on dermatology shows that they describe these lesions as occurring on areas of moist eczema, or seborrhœic dermatitis. The case here reported followed extensive impetigo. The patient, a Japanese boy of five years of age, was admitted to the Vancouver General Hospital on June 2, 1926. His history previous to admission was as follows: two weeks before, he had a cough which was treated by the Japanese blister method. A large blister was raised on the back of the chest. Other children in the family had impetigo, which soon appeared in the blistered area, and spread rapidly. When admitted to the hospital he had extensive lesions of impetigo on body, extremities, head and penis. An area of about two inches diameter about the anus was raw, moist, and tender. The temperature was 101.2°; after three days it had risen to 104.1° followed by a quick drop to 100°, at which approximately he continued for a week. Then the temperature was normal for a long period. All areas responded well to quartz light and an ointment of ammoniated mercury and other antiseptics. Quartz light was continued up to June 28th. Hospital note on July 1st shows: "Back drying and crusting; calomel applied, and ammoniated mercury ointment applied to head and isolated spots on body."

It is evident from the history but not clearly stated, that about the end of June, when the impetigo was thought to be well under control, the vegetations began to appear.

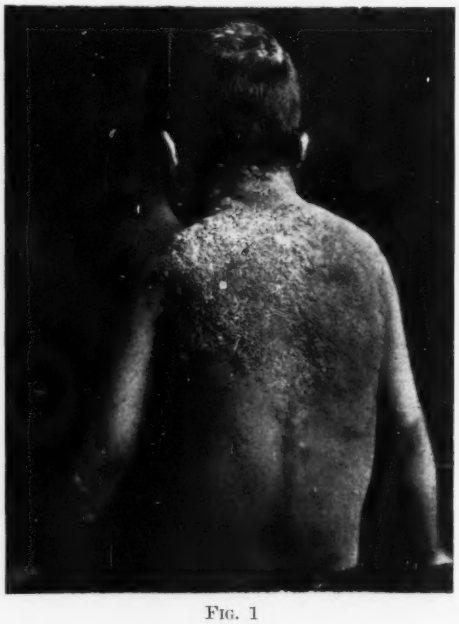

Fig. 1

On July 6th I saw patient for the first time, when the lesions were as follows: from the back of the neck to the lumbar region, extending forward beneath axillæ, one large area. On the head

FIG. 2

FIG. 3

areas from the size of a dime to half a dollar. On arms and chest isolated patches of similar size. These are well shown in attached photographs. They were of a slate colour, dry, covered by horny epidermis, and raised above the level of the surrounding skin by the thickness of three-eighths of an inch; papillated, like the closely crowded papillæ of common warts. About the time they began to appear the hospital records show that the temperature went up again to between 99° and 100° and remained there until improvement was well advanced. Vegetations appeared only on areas that had been denuded of epidermis and were moist. It did not spread over to healthy skin. Many raw spots healed without development of vegetations.

Laboratory report was as follows: Examination of section through a small piece excised from the edge of one of the plaques shows it to be covered by relatively intact stratified squamous epithelium, showing superficial keratinization. In some positions the epithelium is quite thickened, the papillæ large, and dipping downward rather low, but the boundaries are well defined and the basal membrane intact. In another area the epithelium is thinned but intact, and near this area is a considerable amount of superficial degenerated tissue. Laboratory diagnosis: hyperkeratosis. Examinations of scrapings for fungus was negative. Examination for other organisms showed *S. aureus* plentiful, with streptococci and a Gram-positive coccus present.

Moist dressings of Dakin's solution were applied and improvement was rapid until July 22nd, when the surrounding skin began to be irritated by the solution, and we had to change to other mild antiseptics. Many were used but no other applications gave such good results as Dakin's, and on August 11th we returned to it, but the skin soon reacted to the irritation, and we were compelled to abandon its use in favour of a solution of boric acid to the glabrous skin and Whitfield's ointment on the head.

On September 18th we advised removal of a number of teeth which were merely blackened stumps, and the parents took the child home.

At this time all areas had cleared except in the scalp, and a patch on the back about two inches square. These were much thinner than they had been and appeared well on the way to recovery. On November 8th I went out to

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see him at his home, and found the lesions entirely disappeared and the skin normal in appearance.

TANNIC ACID TREATMENT OF BURNS

By J. C. Lindsay, M.B.

London, Ontario

A boy, seven years old, was admitted to War Memorial Children's Hospital suffering from extensive second degree burns, involving the posterior surface of both thighs, the perineum, genitals and buttocks, and almost the entire surface of the left arm and fore-arm.

The burns were deepest over the buttocks and in the anticubital fossa of the arm. He was in a condition of marked shock with disturbance of consciousness, rapid thready pulse and subnormal temperature. Wet saline dressings were at first used, but after a few hours, dressings saturated in 5 per cent tannic acid solution were applied to the lesions on the left side, though the burns on the right side being still treated with the wet saline dressings. The following day the lesions on the left side, though much more severe in degree, were so markedly more comfortable that the tannic acid treatment was instituted on the right side also. By this time the patient showed symptoms of acidosis with some air hunger, and sugar and diacetic acid were present in the urine. Large blebs on the burned areas were opened and the dead tissue denuded. The patient rested in the prone position and a tent heated by electric light bulbs was constructed over him.

During three days the tannic acid dressings were kept constantly applied and on the fourth day were replaced by tannic acid ointment. The necrotic burned tissue was well tanned and was mostly dry. In the course of a week small collections of pus appeared beneath the edges of the tanned areas so that it was deemed advisable to place the patient in the continuous bath for an hour at a time, and the areas of tanned necrotic skin, bit by bit, were removed within a period of three days. Three weeks after admission heliotherapy in the open air was instituted, over-abundant granulations being cauterized with silver nitrate. In all areas there was a progressive gain and the patient was discharged, completely healed, sixty-five days after admission.

In contrasting the treatment of burns with 5 per cent tannic acid solution as compared to the use of normal saline solution, all things seem to favour the former method; the immediate and continued relief from pain, the greatly minimized shock, the markedly lessened absorption of toxic products and apparently a much shorter period of time required for healing.

FRACTURE OF THE SKULL IN A CHILD SIX MONTHS OF AGE*

By Sinclair Battley, M.B.

Windsor, Ont.

The following case of skull fracture in a baby is of interest, because of the very extensive hæmorrhage into the cranial cavity, accompanied by separation of the sutures of the skull and advanced eye ground changes.

The patient, a male child, six months of age was admitted to the hospital in the afternoon. The past history was one of good health with no details bearing upon the present illness. On awakening in the morning the child was apparently quite well. The history given was as follows: During the forenoon while sitting upon the floor, he suddenly fell over and within a short time vomited. He became semi-conscious, although he could be roused. It was noticed by the parents that when he cried, the right side of the face moved but a little and that the left side of the body could not be moved so well as the right. The family physician was called and recognizing the gravity of the situation, advised sending the child to the hospital.

On admission, the patient appeared very ill, was extremely pale, reminding one of a person exsanguinated from hæmorrhage. He was a well nourished and well developed child. He was semi-conscious, but could be roused by stimuation and made to cry. On examination, apart from the extreme pallor, all positive findings

* From the Department of Pædiatrics of the Henry Ford Hospital, Detroit.

were referable to the nervous system. No account of bleeding from the mouth, nose, rectum, or elsewhere could be obtained, and it was thought unlikely that a hæmorrhage of sufficient extent to cause so much pallor could have occurred into the cranial cavity. The red blood count was 2,200,000 and the hæmoglobin estimation thirty-eight per cent. The parents stated that the child's colour previously had been good.

Palpation of the skull revealed no depressed areas or crepitation and no external evidence of trauma was found. There was no discharge or hæmorrhage from the external auditory canal, and the drum membranes were normal. Repeated questioning brought emphatic denials of an injury to the head. As subsequently seen, however, it appears that an injury must have taken place. The right pupil was markedly dilated and did not react to light. There was marked papillœdema of both discs and the vessels were greatly engorged. A large hæmorrhage was seen just below the disc margin on the right side. There was partial left hemiplegia of the flaccid type; the left arm was the most involved, but the baby moved both limbs slightly when roused and crying. The left side of the face was expressionless but the lid was closed when the child was asleep. Reflexes were slightly more active on the right than on the left side. The fontanelle bulged moderately. The systolic blood pressure was 85. mm. mercury.

X-ray films of the skull showed a definite separation of the suture lines and the antero-posterior view showed an irregular rounded shadow on the right side. No evidence of fracture was detected.

The patient was seen in consultation by physicians of the neurological division and the division of neuro-surgery. In arriving at an impression it seemed most likely that the child had had a cerebral accident on top of a pre-existing condition. It seemed unlikely that separation of the sutures and marked eye ground changes could arise in so short a time. A neoplasm or cyst was suspected with resulting internal hydrocephalus upon which the present cerebral accident, possibly a hæmorrhage, had been superimposed. It was not thought wise to perform a lumbar puncture, because of the intra-cranial pressure of unknown origin. As a further aid to diagnosis a ventricular puncture was done through the separated suture lines. The left ventricle was entered and ten cubic centimeters of clear fluid removed. The attempt to puncture the right ventricle was unsuccessful. At this time four or five hours after admission it was apparent that the child was rapidly failing and the blood pressure falling. An immediate subtemporal decompression was decided upon but death occurred before the operation could be performed.

At necropsy the following findings were made: there was no swelling in the skin of the scalp and no external evidence of bruises or skin excoriation in the parietal or occipital regions. The coronal sutures were not tight and a small amount of free movement was possible. The subcutaneous tissues in the right parietal and occipito-parietal regions showed some recent hæmorrhage. The bones of the calvarium were thin. When the skull was removed a large mass of blood clot was seen between the dura and the right parietal bone. This clot had the shape of a segment of a sphere and measured 9 by 9 by 4.5 cm. in greatest diameters. It weighed 175 grammes, was reddish purple and jelly like and was quite evidently a recent clot. The dura over it had a bluish colour and here and there a few minute hæmorrhages were seen. Elsewhere the dura was normal in appearance. The right parietal bone was fractured, the break extending from the squamosal suture at a point approximately opposite the foramen spinosum upward for a distance of about 2 cm., then parallel with the squamosal suture for a short distance, then angling to parallel the lambdoidal suture. The break ran into the lambdoidal suture at a point about 3 cm. from the sagittal suture, and the lambdoidal suture between the point of break and the sagittal suture was freely movable. The posterior half of the right cerebral hemisphere was compressed to about half its normal size. The convolutions of both hemispheres were flattened out. There was a small amount of hæmorrhage into the subarachnoid spaces of the right frontal lobe. The leptomeninges over the base of the brain were normal. The cranial nerves were normal. Both internal ears were opened and were normal. The mass of blood clot was readily pulled away from the skull and dura. It was practically bordered by the sutures of the parietal bone. There was some hæmorrhage into the sheath of a large branch of the middle meningeal artery near the site of the fracture. There was also some hæmorrhage into the dura at the point of attachment to the lambdoidal suture. No tears were actually demonstrated in the branches of the middle meningeal artery. At-

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tempts to inject them failed because of the small size of the vessels.

The conclusions which may be drawn from this case are:

First: extensive hæmorrhage may occur into the cranial cavity of an infant sufficient to almost exsanguinate it. Such hæmorrhage in skull injuries of adults is very uncommon, but the distensibility of the infant's skull and its relatively large size makes this a possibility to be borne in mind.

Second: in such a case advanced eye ground changes may rapidly appear subsequent to a rise in intracranial pressure. This would appear the more remarkable because of the distensibility of the infant skull. It is apparently, but rarely seen in the skull injuries of adults. In a summary of 100 cases of skull fracture in children, from three months to sixteen years of age, Moorhead and Weller[1] have stated that "blood pressure and eye ground signs have not been found as valuable as in adults. Choked disc as a sign of intracranial pressure is a much overated symptom." Holman and Scott[2] reported a case of a boy of ten years in whom a marked bilateral choked disc developed in eight hours following a fracture of the skull. Holman and Scott's observation in the same article on the importance of dilated and fixed pupils as an aid in determining the localization of intracranial injury and hæmorrhage following head injury is clearly demonstrated in this case.

I wish to thank Dr. F. W. Hartman for permission to use the necropsy records.

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DIABETES MELLITUS AND MYXŒDEMA

BY HEBER C. JAMIESON, M.B.

Edmonton, Alta.

The occurrence of glycosuria in the myxœdematous patient has been noted. Osler says that its incidence is rare. Langdon Brown[1] on the other hand thinks "it is not unusual for patients with long standing myxœdema to develop glycosuria. At St. Bartholomew's out of eleven consecutive cases four were found to be passing sugar (Garrod)." Gardiner-Hill and his co-workers[2] from sugar tolerance tests in myxœdema conclude:

"Myxœdematous patients also give a blood sugar curve which is higher and more prolonged than in normal persons. There is rarely glycosuria and it is suggested that the renal threshold is raised in this condition. The fasting level of blood sugar is in the majority of myxœdematous cases within the normal limits. Thyroid extract does not raise the fasting level when myxœdematous patients are treated; its general effect is to lower the blood sugar and to quicken the curve."

The number of cases of diabetes mellitus with myxœdema reported are few. Wright[3] reports two. In one the basal metabolism was - 26, and in the other - 28. The following is an interesting example of this condition:

A homesteader was apprehended by the Provincial Police as his neighbours believed him insane. He was seen by Dr. Carlyle who found sugar in his urine and referred him to the University Hospital for treatment.

The patient was a male, age thirty-seven. Thirteen years before admission he noticed that he was passing an excessive amount of urine. There was a gradual increasing weakness. The appetite increased. There was no doctor within many miles, so no diagnosis was made. The symptoms continued, at times better and at times worse. About one year before he entered the hospital he lost his hair. Six months later he noticed swelling of his eyes, and his eyelashes fell out.

Physical examination showed all the classical signs of myxœdema. The Wassermann was negative. Blood pressure readings gave a systolic of 116; diastolic, 76. Basal metabolism was - 35 and - 36. There was neither sugar nor acetone in the urine. In view of his history he was placed on a diet low in carbohydrate. His blood sugar before breakfast was 0.120 per cent.

A sugar tolerance test was done with the following result:

Time	*Blood sugar*	*Vol. urine*	*Urine Sugar %*
8.30	131	45 c.c.	neg.
9.00	154	..	...
9.30	162	78	0.11
10.00	173	14	0.21
10.30	185	28	0.19
11.00	184	24	0.18
11.30	185	30	0.14

No acetone appeared in any of these specimens.

Thyroid extract one grain three times daily was given. Five days later a trace of sugar was found in the urine. This increased in amount daily. At the end of thirteen days the thyroid extract was discontinued. The basal metabolism was then - 4.

A second sugar tolerance test was carried out.

Time	*Blood sugar*	*Vol. urine*	*Urine Sugar %*
8.15	284	116 c.c.	6.64
8.45	227	23	6.80
9.15	352	13	5.10
9.45	288	47	7.64
10.15	380	50	10.40
10.45	346	39	11.38
11.15	343	37	11.64
11.45	...	73	8.92
12.15	...	55	8.16

Acetone was present in all specimens.

Another test was done a week later.

Time	*Blood sugar*	*Vol. urine*	*Urine Sugar %*
8.00	254	116 c.c.	6.64
8.30	...	27	6.64
9.30	244	60	7.40
10.00	276	..	...
10.30	314	..	...
11.30	349	..	...
12.00	...	60	8.20

Acetone was again present in all specimens.

The patient's weight had dropped from 120 to 97 pounds. The basal metabolism was - 11.

Thyroid extract was withheld for one month. The basal metabolism was then - 41. The blood sugar before breakfast was 0.192 per cent. The weight had increased to 118½ pounds. The patient was now put on a maintenance diet and insulin. Thyroid extract was administered as before. As the basal metabolism rose towards normal the blood sugar level went up. When the basal metabolism had reached - 21, the blood sugar was 0.340.

It was evident that as long as this patient was allowed to become myxœdemic he was free from symptoms of diabetes. When thyroid extract was given and the basal metabolism approached the normal, all the classical symptoms returned. What to do under these circumstances was a problem. A solution of the difficulty was attempted by giving small doses of the extract and small doses of insulin. The patient left hospital after it was found that he did better under this treatment.

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PERSISTENT THYMUS

BY W. L. DENNEY, M.D.

London, Ontario.

This case was admitted to the Memorial Children's Hospital three weeks ago. Very little history was obtainable, as the father of the child spoke no English. The child, aged two months, was having attacks of cyanosis with difficult respiration. This difficulty was apparently neither of the pure inspiratory or expiratory type but occurred in either phase. At each attack death seemed imminent. The child on admission was having from five to ten attacks per day. The temperature was normal and respirations normal between attacks.

Examination revealed an emaciated infant, not acutely ill but exhibiting the above described attacks. Over both lungs posteriorly, pure crepitations could be heard. These did not sound like the ordinary râles of bronchitis or broncho-pneumonia, but were of a much finer quality and were probably due to compressed lung tissue. Over the upper part of the precordium, there was an area of absolute flatness extending across the lower part of the manubrium and about half an inch to the left of the sternum. A diagnosis of enlarged thymus gland was made.

A Roentgen ray treatment was given five days after admission. This gave immediate relief. Eleven days after the first treatment the child had one slight attack of cyanosis. The second treatment was given four days ago. Since then there have been no attacks. The general nutrition has improved and the weight is increasing.

A CASE OF ENCYSTED SHRAPNEL

BY ARTHUR O. ROSE, B.A., M.D.,

Superintendent of the Hafford Hospital, Hafford, Sask.

On September 16, 1926, an ex-officer of the Polish army came to us complaining of a lump in the palm of his left hand. He reported that the *abscess* had been previously drained (July, 1926), but had reformed, and was not only painful, but incapacitating.

Upon examination we discovered a non-inflammatory, fluctuating mass, apparently deep to the palmar aponeurosis, and about the size of a blue plum. We concluded it was a cyst, and forthwith removed it. Upon opening the mass we discovered, lying in a flocculent fluid, a piece of lead, the size and shape of a marble, with four rounded indentations, like facets.

The man then gave the further history, that in 1921 he had been under shell fire, and five pieces of shrapnel had penetrated the left side of his face. Three were removed at the time, one was discovered and removed from his neck, two inches lower than the point of entry, a year later. The other one, he concluded, had been only superficial and had somehow escaped. The patient insisted that he never at any time was wounded in the hand, and that the piece extracted resembled those previously removed. He further attributes to the gradual descent of the small mass, the pain, felt in his left arm, extending over a period of two years.

There is every reason to believe that the piece of shrapnel removed from his left hand in September, 1926, penetrated the side of the face in 1921, and has been gradually descending.

Reviews and Retrospects

THE RELATIVE VALUE OF THE ROENTGEN RAY AND OF PHYSICAL FINDINGS IN THE DIAGNOSIS OF PULMONARY TUBERCULOSIS*

By A. T. Henderson, M.D.

Montreal

In a very interesting and unusually valuable article Dr. Fales of the United States Veterans' Hospital in Livermore, California, reviews and discusses the relative values of these two methods of investigating the existence, the extent, and the activity of pulmonary tuberculosis, and draws conclusions from a careful correlation of the two methods of investigation employed in a series of 245 tuberculous veterans. The evidence on which the diagnosis of the presence of the disease was based were any two of the following data: positive sputum tests; a parenchymal roentgen ray lesion; pleurisy with effusion; medium râles; and pulmonary hæmorrhage. He considered that any two of the above were sufficient evidence for a definite diagnosis of pulmonary tuberculosis.

In the physical examination little attention was paid to broncho-vesicular breathing and variations of it, when met with in the apices, as these were acknowledged to be also characteristic of some other pulmonary conditions. Slight dullness in the upper part of the chest was regarded as of doubtful significance, and the main reliance was placed on the existence of râles. and definite dullness. The additional signs characteristic of cavitation, pneumothorax, and other conditions met with in far advanced cases were of course considered, but do not call for attention in this paper. In roentgenograms, hilum infiltration and peribronchial thickening, even when studding was present and the linear markings reached the periphery, were not considered of significance as indications of the presence of pulmonary tuberculosis. Parenchymal infiltration, that is, infiltration affecting the alveoli or groups of alveoli was regarded as a definite indication of pulmonary tuberculosis. As these infiltrations presented different shapes in the roentgenogram they are spoken of by some as mottling, by others as cirrhus clouding, and by Dunham as fans. Colonel Bruns is quoted as follows: "We do not pay any attention to peribronchial infiltration, and only diagnose tuberculosis on parenchymal shadows. Mistakes are made by those roentgenologists who pay too much attention to so-called peribronchial infiltration." Dunham also states that thickened trunks and enlarged hilum shadows in the skiagram can never be considered as being definitely the result of tuberculosis, unless calcification or caseation are also shown to be present, and even then they are not in themselves evidence of active disease.

Definite constitutional symptoms such as elevation of temperature and rapid pulse have always to be considered as signs of activity and were present in nearly fifty per cent of the tuberculous cases. A comparison between cases showing only peribronchial thickening, and those showing parenchymal infiltration as to the presence or absence of other signs is significant. In but 1.6 per cent of the cases showing only peribronchial thickening were râles found, and in no case was the sputum positive; while in the cases showing parenchymal lesions in ninety-three per cent râles were found, and in sixty-eight per cent the sputum was positive.

Some clinicians endeavour to determine existing lung lesions from the clinical findings and constitutional symptoms alone, but the results

* Relative value of the roentgen ray and physical signs in the diagnosis and treatment of pulmonary tuberculosis, by Louis Henry Fales, M.D., *Am. J. M. Sc.*, Phila., Sept., 1926.

thus obtained are often inaccurate. Constitutional symptoms may inform us regarding the existence of allergy or perifocal reaction, but they afford doubtful information regarding the nature and extent of the lesion. Physical findings may depict accurately the extent of the lesion, but they not infrequently fail if an attempt is made to determine from them the pathological picture and its activity.

Many who have been in tuberculous work for a long time have been uncertain as regards the actual pathological lesion represented by râles. In not a few patients, who faithfully carry out instructions, râles all of similar character may be observed for month after month, sometimes year after year. There may be little cough or expectoration, slight or no constitutional symptoms, and the general condition may be good, but the râles do not change. These patients were at first termed *stationary-active*. This term must now be regarded as a misnomer. It was not until an explanation was given by Colonel Bruns at the FitzSimmons Hospital in 1923, that the true mechanism of these râles was suggested. Colonel Bruns stated that the râles frequently considered most characteristic of pulmonary tuberculosis were not due, as was generally supposed, to secretion in the alveoli and small bronchi, but were atelectatic in etiology and were produced by the imperfect expansion of alveoli in a collapsed state; a state brought about by the presence of an exudate or infiltration in a neighbouring lobule, or by the constriction or contraction of areas of fibrous induration, or by the partial occlusion of bronchioles by the pressure of inflammatory tissue, or by the constriction produced by fibrous bonds. Such râles remain unchanged irrespective of how much the patient may cough, or raise during examination. They are fine or medium, but they are uniform in size and may occur in showers and always at the same phase of respiration. As a rule, a cough is necessary to elicit them. Such râles may be encountered in all the pathological and anatomical types of tuberculosis. It is true that as the lesions clear up and heal these râles may disappear, but we see many cases in which they persist after the disease is arrested and the patient is virtually cured. It is very evident that such râles, formerly considered one of the characteristic signs of tuberculosis, are of little value in depicting the active pathological conditions. Whether a lesion is caseous or fibrous, active or arrested, the râles may persist and long retain the same characteristics.

It is in helping to determine the lesions actually present in the lung that the roentgen ray has its greatest value. Colonel Bruns states that of all methods at our disposal the roentgen ray is the most valuable to afford us exact information regarding the pathological condition of the lungs in pulmonary tuberculosis. Armed with the knowledge gained from previous studies it is possible for the trained observer by means of roentgen-ray pictures to tell us what has happened, what is happening, and what probably will happen. The value of the roentgen ray in the diagnosis and treatment of pulmonary tuberculous conditions is firmly established, for it enables us to study the progress of the disease in its unfortunate host.

It should always be the aim of the examiner to judge not merely of the presence of râles or dullness, but also of the character of the underlying pathological condition. It must be regarded as a waste of time to make the physical examination, and then after some days read the roentgen ray plates. Stereoroentgenograms should always be made as soon as possible after the patient enters the hospital. These should be at hand when the physical examination, is made. With the complete history before him the examiner makes the physical examination. charting his findings on chest diagrams in a book kept for that purpose. The roentgen ray picture should be at once compared with these physical findings so that if any differences appear the patient can be carefully re-examined.

Of the 245 definitely tuberculous cases, out of a total of 441 examined, ninety-one per cent grossly and approximately agreed in their roentgen ray and physical findings. After very exact comparisons it was found that only in 124 cases or fifty per cent of the tuberculous cases the area of involvement as shown by the roentgen rays and physical findings was definitely the same. In eighty-eight cases, or thirty-six per cent, the roentgen ray showed more involvement. In twelve cases or five per cent the physical signs indicated more than the roentgen rays. In seventeen cases, or seven per cent there was evidence of disease in the skiagrams but no definite physical signs, while in four, or about one and one-half per cent, there were physical signs but no demonstrable roentgen ray findings.

To look at a single isolated picture of a diseased lung and to flatly diagnose activity is thoroughly unscientific and certain to invite error in many instances. At varying intervals serial pictures should be made and the activity or definite extension of the disease or its progress towards repair can then be judged. The fact that pathological activity may exist without constitutional symptoms is of importance. Although constitutional symptoms afford as a rule evidence of value in determining activity it is never safe to put absolute reliance on them, and in an apparently quiescent case to start exercise, heliotherapy, or tuberculin without checking up frequently by an examination by means of the roentgen rays. The following conclusions may be drawn: The roentgen rays should be regarded as of equal value to physical findings in making our diagnosis, and of greater value in determining the exact existing pathological condition of the lungs. They have their greatest value in the routine care of our patients. Constitutional symptoms and physical signs are often deceptive as to the progress of the case, and if dependence is placed on them alone the physician will frequently be misled. Serial roentgenograms taken at intervals

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of from two to six months portray more clearly to the physician the ever changing pathology in pulmonary tuberculosis than do the physical findings.

NEW DEVELOPMENTS IN OUR KNOWLEDGE OF THE GALL BLADDER*

By C. J. Tidmarsh, M.D.

Montreal

By the physiologist, the gall bladder is regarded as a reservoir and a concentrator of bile, and as a regulator of pressures within the biliary system; by the clinician, this organ is regarded, with increasing interest, as the most common organic cause of dyspeptic symptoms. The present discussion embraces both the physiological and clinical aspects of recent experimental work, and is presented under three headings,—(1) pathogenesis of cholecystitis, (2) diagnosis, and (3) physiological considerations.

(1) It was formerly held that cholecystitis is produced by bacteria which are carried to the liver, excreted into the bile and, reaching the lumen of the gall bladder, infect the mucous membrane. But the experiments of Cushing and of many others seem to have shown conclusively that the mere presence of pathogenic bacteria in the gall bladder lumen is not sufficient to induce cholecystitis. In 1918, Graham and his associates demonstrated that, in man, hepatitis is a constant accompaniment of cholecystitis, and that, therefore, cholecystitis must be considered as part of an inflammation of the whole biliary system. In later publications they stated that, in the majority of cases, cholecystitis is produced by a direct extension of inflammation from an already inflamed liver to the wall of the gall bladder, via an abundant lymphatic anastomosis. The richest supply of lymph vessels in the gall bladder being situated immediately beneath the serosa, it is here that the early evidences of inflammation have been found to occur. It is not held that *all* cases of cholecystitis are due solely to a lymphatic spread from a hepatitis. Hæmatogenous and contact infections occur, but are thought to be relatively few in number. In such cases, the liver may be infected secondarily to the gall bladder, and a vicious circle be thus established.

(2) In the diagnosis of cholecystitis, examination of the gall bladder bile, using the Lyon method (magnesium sulphate placed in the duodenum), would seen unsatisfactory, since neither the mucous membrane nor the bile may be altered, particularly in early cases. Tests of liver function are equally disappointing owing to "the large factor of safety of the liver, which precludes the use of any functional test to detect minor disturbances of the organ" (Gonzalez and Kerr). The use of Roentgen ray examination following the administration of a substance which renders the gall bladder visible is proving to be a most reliable diagnostic aid. After experiments with numerous substances, the author found the sodium salt of phenoltetraiodophthalein to be the most satisfactory. As high as ninety-seven per cent of this substance is secreted by the bile. In the gall bladder the substance is concentrated by the absorption of water. The most dense shadows are found therefore in normal subjects. No shadow, or only a faint one, is found (*a*) if the liver is unable to secrete the substance normally, (*b*) if the cystic duct is occluded, or (*c*) if the gall bladder is unable to concentrate its contents because of a diseased wall. Fasting during the concentration of the substance is essential, because the presence of food in the duodenum is accompanied by an outpouring of bile and consequent disappearance of the shadow. Cholecystography is therefore rather a means of studying the function of the gall bladder than an indication of the exact pathological lesions present.

Dr. Graham prefers the intravenous method of administration as being more accurate and reliable than the oral method. The objection to the latter method is the uncertainty concerning the amount of the substance which has been absorbed. Details of the technique are described and compared with others in general use. The fear of severe toxic reaction from the use of the intravenous method is apparently unfounded. Case having reported 600 cases, with reactions (limited to nausea and vomiting) in only two or three per cent. Thrombophlebitis at the site of injection may be completely obviated, if the vein is washed out with a little saline immediately after the injection.

Roentgen ray diagnosis of cholecystic disease has been shown to be correct in from ninety to ninety-seven per cent of cases. The criteria are,—(*a*) Failure to obtain a shadow when the technique has been properly carried out. (*b*) Filling defects,—soft calculi, stones, etc. (*c*) Irregularities of contour,—adhesions, diverticula. (*d*) Variations from the normal in the time of appearance and disappearance of the shadow.

(3) Cholecystography and recent experiments have added to our knowledge of the physiology of the gall bladder. Cholecystography has shown that bile passes out of the gall bladder through the cystic duct, thus disproving the contention of Sweet and others that bile is absorbed through the gall bladder wall and cannot pass out through the cystic duct. The presence of the sphincter of Oddi, and Meltzer's theory of reciprocal innervation between it and the gall bladder are questioned. Copher and Kodama, working in Graham's laboratories, have been unable in many cases to demonstrate a distinct sphincter apart from the fibres of the muscle coat of the intestine. They consider that the anatomical arrangement of the common duct in the wall of the intestine constitutes a sphincter-like mech-

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* Evarts A. Graham, *Am. J. M. Sc.*, Phila., Nov., 1926, clxxii, No. 5.

anism which is dependent upon the tonicity of the intestine, and makes it possible for intestinal peristalsis to be a factor in regulating the flow of bile from the common duct. The final question discussed is the mechanism by which the gall bladder empties itself. Direct observation and stimulation at operations, and lengthy fluoroscopic examination with cholecystography have failed to reveal any contraction of the organ comparable with a peristaltic wave. In structure, the gall bladder musculature is relatively poor, but the connective tissue layer is three times as thick as that of the intestine and is very rich in elastic tissue. The recent work of Copher and Kodama, in which observations were made by the cholecystographic method, after substituting a small rubber bag for the gall bladder of a dog, has led them to support the view of Boyden that the gall bladder is a passive structure from a mechanical viewpoint except for the elasticity of its wall.

Dr. Graham concludes that the gall bladder is a distensible viscus which responds to increased pressures in the common duct by becoming distended. When the ductal pressure is lowered by a sudden opening of the intestinal end of the duct there is an elastic recoil on the part of the gall bladder wall which results in the ejection of bile from the organ The intermittent opening and closing of the duodenal end of the common duct results in a gradual washing out of the gall bladder, but the organ can never be entirely empty. This work, in the author's opinion, leaves little rational basis for the Meltzer theory of reciprocal innervation between the so-called sphincter of Oddi and the gall bladder.

Influence of Insulin on Mortality from Diabetes.—A statistical study of the mortality from diabetes in England and Wales, with special reference to the introduction of insulin, has been made for the National Institute of Medical Research by Matthew Young and W. T. Russell. The report appears in the *Quarterly Journal of Medicine*, October, 1926. A definite decline in the mortality rate from diabetes is noted in the years immediately preceding the introduction of insulin. Since insulin became available, the quantity issued in December, 1923, would supply 15 per cent of the estimated diabetic population; in December, 1924, 31 per cent; in December, 1925, 38 per cent. As the distribution of insulin may have been unequal, London, for example, having doubtless obtained a disproportionately large share, the statistics of England and Wales as a whole, London, county boroughs, urban districts and rural districts are each considered and compared. The drift in the mortality rate is strikingly similar in each table. In view of the undoubted efficiency of insulin in prolonging the life of the diabetic, one would expect that the decline in the diabetic death rate would be relatively more rapid since the introduction of insulin. The change in this respect is comparatively small. The authors conclude that "though other factors may have been operative in producing this state of affairs, there seems to be evidence to warrant the suggestion that, probably from some lack of appreciation by general practitioners of the valuable remedy for the disease at their disposal, and largely from lack of resolution on the part of those who suffer from the disease to persevere with the use of what is, at present, a somewhat irksome form of treatment, many valuable lives under the age of sixty-five, that could most probably be prolonged, are still being lost to the community." W.H.H.

Aviators preparing to fly at high altitudes may now carry their oxygen supply in liquid form in thermos bottles, and thus do away with the transportation of heavy steel cylinders containing the compressed gas. This is the invention of M. Garsaud, of the French Academy of Sciences. Not only is it easier to carry oxygen in this way, but larger quantities can be transported in a very small space. The bottles are made of enamelled metal and have two openings at the mouth, one leading the gasified oxygen into the mask worn by the aviator and the other for the passage of a wire carrying an electric current. The electric current heats a tiny quartz lamp inside of the bottle and thus vaporizes the necessary amount of oxygen. The only inconvenience of the apparatus, M. Garsaud says, is splashing of the liquid oxygen in the bottle. This could cause explosion unless corrected by filling it loosely with asbestos. Liquid air can be carried in these bottles for as long as six days at a time.—*Science Supplement*, Dec. 3, 1926.

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Editorial

THE CARE OF THE SICK*

Treatment, and hospitalization, and payment therefor.

IN two previous articles which have appeared in the *Journal* there has been a consideration of the means of diagnosis and opportunities for consultation, and how they may be made more widely available to the needs of ordinary average people. Something of what has been said of the fuller use of facilities for diagnosis might very well be repeated about facilities for treatment, though there is much in the dictum of Gee that the first part of medicine, is Diagnosis, the second *Diagnosis*, and the third *Diagnosis*.

For one thing we need more hospitals, better and broader hospitals, more facilities gathered into hospitals, more services radiating out from hospitals, more use of hospitals by the people, better ways of supporting hospitals, more hospitals becoming real community health centres. We need more hospital beds available for diagnosis, for observation, for a few weeks' rest for tired-out people, for fairly long periods of rest in cases of more chronic type. What is partly provided now for the tuberculous and the psychopathic should be available for some suffering with heart lesions as well. We need more beds for longer convalescences. As they are, hospitals are pressed for room, and boast their low average stay of patients, their rapid turnover. There might be reason in a boast of longer average stays of patients, and a slower turnover, if this could be managed. A longer convalescence may be both cure and prevention.

The first hospitals were refuges for unfortunates and outcasts. The first community hospitals were "fever hospitals," for community protection, quarantine stations. But the idea has grown that all disease is somehow an affair of the community, and the hospital is slowly taking on the functions of a general community health centre. Community decency demands that derelicts, citizens with only a past, should be cared for, and in a fine spirit. But community economy demands that citizens with a future shall be cared for also. The hospital, which has been a dispenser of charity to the few, is becoming a dispenser of medical science to all.

The factory is the workshop taken out of the home, and organized. The public school is a part of the teaching function of the home transferred to the community. The hospital is the sick-room of the home transferred to a specially equipped centre. Few people, if indeed any, even the rich, can provide in their own homes in serious illness the team-work of the well-equipped hospital, physician, surgeon, pathologist, radiologist, nurses, dietitian, apparatus, planning, orderliness, quiet, the efficiency of specialism, safeguarding against infection, readiness for emergencies. The hospital is the logical place for the sick of the community as the school is for the scholars of the community.

The question is not, shall the ordinary sick citizen be received into the hospital, but how can the door be opened to him somewhat as the school door is to his girl and boy. The commonest saying about hospitals as we have them is that they are for the poor and the rich, but impossible for all between. Nor can this defect be laid altogether at the doors of hospitals. There is perhaps no problem in social administration more difficult than the founding of hospitals and conducting them on a proper basis, so that they may welcome all, help all,

* Part III of abstract from presidential address before the Manitoba Medical Association, September, 1926.

yet hopelessly burden none, and pauperize none. It is time to realize that the best basis for the care of the sick in hospitals is still a problem unsolved, though surely not impossible to solve in an age of scientific yet sympathetic study of community problems. Not all essays in hospitalization have been wise. Not all hospital demands have been warranted. Hard heads and hard hearts have made a bad combination, but soft hearts and soft heads a worse one. The sympathetic heart and the scientific head go well together. Judgment guides charity, and charity perfects judgment. "True charity is sagacious." (Sir Thomas Browne).

The tendency of the day is to throw more and more of the care of the sick, in and out of hospitals, on the community, and the disabilities and widowhoods that follow illness also. The public purse is a sort of neighbourhood cow that everybody wants to milk and nobody wants to feed. It is the function of governments to pay, but they have a higher function also, which is to plan. Our idea has been that many and various small volunteer groups shall do the planning, and the community shall do the paying. Possibily this should be reversed; the community devise the plan, and the people pay. At any rate the most urgent need is the plan.

I am convinced that we have gone about far enough in the direction of free treatment. We should be careful how we give to any citizens, for any reasons, on under any circumstances, blank cheques by which they may draw upon the resources of the community. The primary responsibility for illness and the costs of illness should lie upon the individual. For this there are many reasons. Sickness is as often a fault as poverty is. If every man who has lost his health by carelessness or slackness or shiftlessness is to be a privileged public charge as long as he wants to be, why not the man who has carelessly or shiftlessly lost his money.

And if all illness is to be carried without question by the community, it will often be very hard to decide just where health stops and sickness begins. Few are one hundred per cent ill, and none of us are one hundred per cent well. Every doctor knows that in hard times especially, a differential diagnosis has often to be made between sickness and unemployment, or sickness and imagined sickness, or sickness and a chronic disinclination for work, or sickness and some complex of circumstances that sickness would provide a welcome escape from. It is wonderful what persistence and ingenuity will do in establishing a malingerer as a public charge. Men of not much health, but plenty of "gumption" will work every day, while men of better health but less "gumption" have meals served them in hospital wards. The work of the world is done by people less than one hundred per cent well and always has been. Dr. William Charles White tells of three men chosen for an important bit of work for the state, who found when they met and took stock of one another, that one had been operated on for cancer, and was keeping tuberculosis under control, the second had crippling and disfigurement from x-ray burns, and the third had latent tuberculosis and disabilities from a railway accident. With less reason many have been permanent burdens upon the community. But these men were assets to their community, and thought of nothing but coming blithely to their day's work.

The fight against illness is not physical only, but has a real moral quality as well; the reaction of a man against misfortune, which is something like the reaction of a nation at war. The religion the sick man needs is one of fortitude, self-denial, earnestness, and this can be coddled out of him by slush, and sentimentality and self-pity, which for him are the world, the flesh and the devil. To lose health is bad: but to lose moral stamina is worse. For a man to get out of hospital with legs and lungs healed, and body patched up, but moral backbone flimsy for life, is not a triumph but a tragedy.

Men who work to keep hospitals open complain of the growing number of people who spend all they earn, and so have no waterproof for a rainy day.

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The poor we have always with us, but many of them wear much better clothes than they used to do, and keep a car. The idea seems to be that living in a paternalized community there is no chance of being left to starve by the wayside. "Let us eat, drink and be merry," say they, "Burn midnight gas and let insurance go hang." If the pace should break us, what are hospitals for but to care for us? And when we die, or the car turns turtle, what is the community for but to take up the burden of our dependents?" And should a hospital, in the very presence of illness, merely mention such a sordid matter as money, it is as though an outrage had been committed. The modern sentiment about illness, that it is a holy thing, which should be able to seek sanctuary without question, anywhere, at any time, for any length of stay, is only part right.

Of course the hungry must be fed, no matter *why* hungry, but that community has not yet mastered its social problems in which poverty is always an emergency, with a new plan to meet each new one, and the cure always a dole. And that community has not yet mastered its problems in which sickness is always an emergency.

A house on fire is an emergency for the householder, but not for a community with fire brigades and insurance. John Smith's illness is an emergency for the Smiths, but surely not for Smithville with modern medical science and hospital organizations. Every fire is an emergency to some one, but fire proofing, building regulations, fire drills and insurance are not emergency measures – are useless in emergencies, but prevent emergencies. Fires and sickness are almost as sure to come as death and taxes, so should be provided for beforehand—though prevented if possible. A fire may be stark ruin for the unprepared but only a regrettable incident for the forward-looking man who has foreseen such a mischance and prepared for it. Sudden illness, or long illness, may bring not suffering only, but bankruptcy; but if twentieth century medical science can find means to relieve the suffering, surely twentieth century economic and administrative science can find means to avoid the bankruptcy.

Perhaps a reasonable and workable way of paying the costs of illness might be found in some general plan of more or less compulsory personal insurance under state auspices. In workmen's compensation arrangements, we have such a basal principle already accepted by governments. At any rate, the proper time to pay the costs of illness is while well and working, not while sick and spending. Such an arrangement would be a great boon not only to sick people and the heads of sick families, but to hospitals and doctors as well. Both these unfortunately have to earn their livings from the sick, since the belief still prevails that they that are whole have no need of the physician, but they that are sick.

Paying for sickness while sick is bad enough without a supertax. Hospitals are half filled with people who cannot, or will not, or do not pay, and half the time and energy of many physicians is spent without fee or reward. Now hospitals have to pay their grocers' bills, as other people have to, and doctors must live, for is it not written in the book of Ecclesiasticus, "Then give place to the physician for the Lord had created him?" and again Ecclesiasticus, "The skill of the physician shall lift up his head, and in the sight of great men he shall be in admiration."

How is the extra burden to be carried? From time immemorial it seems to have been decreed that the paying sick, in the very depths of their own distresses, should be supertaxed in their hospital charges and doctors' bills to help with the burdens of the non-paying sick. The provident sick, while yet in bed, must be supertaxed to help the non-provident. Sickness evidently is taxed as a luxury. Whoever devised this plan I do not know, but I have a suspicion that it dates back to the middle ages, and to a certain personage, one Robin Hood to wit, who by way of curing social ills robbed the rich to relieve the distresses of the poor. Is a social method, outlawed in the thirteenth century, quite good enough for the

distribution of scientific medical care in the twentieth?

Yet, on the other hand, it would be doubly wrong to limit the doctor's *giving*. He is a poor excuse for a physician who is not essentially a missionary. Now it is of the very nature of missionary work that those who need it, and get it, cannot pay for it, or will not. If the anti-tuberculosis campaign of education, diagnosis and treatment and segregation had to be paid for, from this day forward, item by item, by those whose lives it is saving, the whole thing would be at an end, and we would lose in a month or two what has been gained in a generation.

"The care of the sick is to be placed above and before every other duty." There is little doubt that the men of our profession today walk in the way of that precept quite as straitly as the average confreres of Saint Benedict, but we work in a system which for our day is even more obsolete than theirs. Ways must be found for a far wider application of our very wonderful medical science to the needs of men. Nothing else matters to our profession, but that it should do its utmost for the help of the people. What its place may be in any new order that may come will depend upon the greatness and the spirit of our services. As Hippocrates said, "Where there is love of humanity there will be love of the profession." Tributes to the Maclures among us have been for what they gave, not for what they got. Whether we recognize it or not, even the cement that holds us together,—as Cushing has recently told us—is not self-interest but a common devotion to a worthy cause. Some better system may well bring to us a vista, a scope, and even a dignity we have never known. At any rate the spirit of our calling is the precept of Saint Benedict, which, to close with, may be given again, but this time in the words of Sir Thomas Browne—"Though a cup of cold water from some hand may not be without its reward, yet stick not thou for wine and Oil for the wounds of the Distressed."

D. A. Stewart

THE CANADIAN NATIONAL COMMITTEE FOR MENTAL HYGIENE

IN this issue of the *Journal* we publish an account of the annual meeting of the Canadian National Committee for Mental Hygiene held in Montreal on December 3, 1926. Our readers will be interested in the address on "Mental Hygiene and Public Health" by Dr. George E. Vincent, President of the Rockefeller Foundation, and in the reports of the activities of the Committee.

Since 1918 the National Committee has directed its attention to the improvement of facilities for the diagnosis and treatment of existing cases of mental disability and to a programme of prevention. For a five year period government surveys were conducted for the purpose of gathering facts concerning the problem of mental and nervous disorders in Canada. These studies made it clear that the mentally disordered were far more numerous than had been expected; that treatment facilities both in and out of institutions were often inadequate; that because of neglect to provide efficient treatment the national efficiency of the country was being greatly reduced; and that prevention in Canada had not been practised nor had it been considered seriously.

It is to the credit of the National Committee that it has been successful in winning the support of Governments and other official bodies for the promotion of a progressive mental hygiene policy. Millions of dollars have been spent in accordance with Committee recommendations for the enlargement and improvement of mental hospitals, for the establishment of special elasses for subnormal children in schools, for the organization of mental clinics, for parental education in child rearing, and for many other projects of a similar nature.

The research programme of the National Committee is of particular interest.

For the last three years the Committee has been working out a research policy in co-operation with Canadian universities. Satisfactory arrangements have been made at McGill University and the University of Toronto with a beginning at the University of Manitoba. The National Committee provides a portion of the salaries of research workers and the universities concerned grant the remainder. At present sixteen psychiatrists and psychologists are employed on this co-operative basis, and studies are being prosecuted that may throw light on the causation, development, treatment and prevention of mental disorders.

In commenting on the research policy of the National Committee Dr. George E. Vincent remarked: "Should the Canadian Committee develop independent research or co-operate with Universities? There is no doubt as to the answer. The policy that has been adopted by this Committee is an enlightened, sound and statesmanlike policy, to develop and place in university centres of Canada men and women who are interested in mental hygiene problems, who will be able to establish permanent, enduring centres of research activity and the practical application of its findings. It is hoped, and I am sure it is the object of the Committee, to work itself out of existence at the earliest possible time—at a time when mental hygiene permeates and forms an integral, essential and organic part of the life of the country."

The Committee has been successful in securing funds from public spirited Canadians, from Governments, from Corporations, and from the Rockefeller Foundation. It expends approximately $50,000 per annum on its work. In co-operation with the Rockefeller Foundation and the Laura Spelman Rockefeller Memorial it has sent thirteen Canadians abroad to study mental hygiene, at an additional approximate cost of $25,000. These Canadians will return to exert leadership in the Dominion.

It would seem that the prediction of the late Sir William Peterson is coming true when he said in 1918: "I consider that the organization of this National Committee will prove to be one of the most significant developments in the history of public health in Canada."

The medical profession is vitally interested in the Mental Hygiene Movement; and wishes the National Committee the greatest possible measure of success in its splendid work. C. M. HINCKS

THE CANADIAN COUNCIL ON CHILD WELFARE

BEHIND the actions of governments lies public opinion. Undoubtedly their actions may not always express the opinion of a majority of the electorate; the reason for this usually is that the majority of the electorate have no opinion on many matters.

It is necessary, therefore, that those who have an opinion, those who are thinking along certain lines, should be in a position to express their views to their respective governments. They should also be prepared to explain their ideas to the people, as well as to support the actions of governments if their opinions are acted upon.

The Canadian Council on Child Welfare brings together those who have worked and studied in the field of child welfare. It, therefore, voices the opinion of that group. As a council it is divided into sections, one of these being that on Child Hygiene. This particular section is interested in all phases of child welfare which have to do with the health of the child.

While the interest of this section is primarily that of health, it is quite evident that there is no phase of child welfare work in which the health side can be neglected, nor, indeed, is there any work for children in which those interested in child hygiene have not an interest.

For example, the question of child immigration (studied by the Council since

1922, as evidenced by two published reports) is one which is of interest to those who consider the future health of Canada; it is certainly also of interest to those who are thinking along the lines of labour problems, of juvenile delinquency, of care in foster homes, of education and recreation, and of the spiritual life of our nation.

When a representative group considers such a problem from all these angles, it is only reasonable to expect that their voice will receive the attention of governments and of the public, so that in this way they can contribute materially to a betterment of conditions for the child.

The Council, like every other organization, has a limited staff and a limited budget. Naturally, the amount and scope of work is largely dependent upon these two factors. The Section on Child Hygiene has undertaken the following specific pieces of work.

The publication and distribution of ante-natal letters. A continuous demand from expectant mothers all over Canada has shown the need for this service. The letters were published with the approval of all the Provincial Departments of Health. Two of the provinces were already publishing such letters. Two of the others requested the Council both to print and distribute for them. The remaining five asked that these letters be printed on their own letter-heads and that they do their own distributing. All these requests have been met.

The Council carries on publicity in the press all over Canada concerning this service. The letters were carefully prepared, they were approved of by the recognized authorities, and were then printed in both English and French.

The greatest stress is laid, and constantly repeated advice is given in these letters concerning the need and value of medical supervision. This can be made clear to any physician who will write the Council for a sample set of the letters, and who will take the trouble to read them.

Growing out of the ante-natal letters came a demand for patterns for layettes, etc. The Council has endorsed those issued by a Canadian company according to designs submitted by the Council. They are sold at a very low price.

To meet the demand for a form upon which to record the physical examination of, and subsequent work done for well children, two forms have been published. One is for the use of physicians in their private practice or in clinics. The other is for use in consultations which are in charge of a public health nurse only.

There is a demand for such forms from small centres, and to such centres they can be sold at a fraction of the cost of printing small quantities. The use of a universal form also tends to standardize work and to make it comparable with that done in other places.

The Canadian Public Health Association for some years has published a set of diet folders. It has now been arranged that this Association retain responsibility for the subject matter of the folders, but that they be published by the Council. This is typical of the manner in which the Council works—co-operating with others, sharing responsibility and effort in order to accomplish the common aim.

The Health Section is publishing some posters. One of them—*The Gay Adventurers*—is now ready for distribution. Literature in the form of pamphlets, to meet the demands not already covered, is issued from time to time as the need arises.

Two very interesting and instructive health posters have been published by the Council. One under the heading: "Where Does Your City Stand?" is a graphic presentation of the cities in Canada according to their infant mortality rate. The second is headed: "Why Babies Die," and is also a graphic presentation of the causes of infant deaths. Undoubtedly such posters will assist in making clear to some cities their unenviable position in regard to the preservation of child life, and will also point out that many infants die from preventable causes.

All this is the early effort of one section of a comparatively new organization which has taken place in Canadian affairs. As has been truly said, our human capital

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is our most precious possession and it behooves us to give attention to it. The Council does not expect to work miracles, nor does it seek to advertise itself by freakish or startling publications or actions; it believes rather that quiet, consistent work built up gradually on a sure foundation is what makes a real contribution towards the improvement of child welfare conditions. This is the Council's reason for existence and this is its reason for expecting sympathetic support in its future years of work.

A. GRANT FLEMMING

A DISSERTATION ON DISCONTENT

WHAT history we have of man is largely a record of discontent. In the main, man's activities are but reactions to his discontent. If and when he becomes contented, he usually goes to sleep. The greatest urge to accomplishment is dissatisfaction with things as they are.

A divine discontent has poetic approval. It may, therefore, be assumed, that there are forms of discontent which do not merit the poet's praise. At any rate, there will be general agreement that discontent may be harmful as well as helpful. Perhaps it is a matter of dosage. We are enjoined to be temperate in all things. Excess in indulgence of even divine discontent cannot be recommended on hygienic grounds.

Evidences of the benefits of discontent are so plentiful and so obvious that enumeration is quite unnecessary. One example of the evil of contentment may be cited. Galen wrote medical books. Men were contented with what he wrote. For more than a thousand years no progress of any moment was made in the advancement of medical knowledge.

The abuse of discontent is responsible for many of the major ills of society, and for many of the minor ills of the individual. Some of the minor ills of society and some of the major ills of the individual may also be attributed to this cause. From the clinical viewpoint, discontent with one's self is perhaps fraught with more peril than discontent with other things. Such discontent is unlikely to be heralded abroad with much enthusiasm, at least in undisguised form. Perhaps, it is not to be differentiated from the inferiority complex which certain psychologists proclaim as the cause of much disturbance of mental functioning. It would seem that this bothersome complex, rather than the conscience which monitored Hamlet, should make us of to-day consider whether we shall bear those ills we have, or fly to others that we know not of. If we can be satisfied to grunt and sweat under a weary life, to accept the facts and struggle along under an acknowledged handicap, we will do well. But such a muster of fortitude exceeds the capacity of many who, if we are correctly informed, choose—doubtless without full awareness—to project their inferiority upon others on the chance of deriving comfort to themselves. The comfort, however, is dearly bought both for the individual and for others. The truth, though crushed back into the unconscious, struggles ceaselessly to emerge again. An unremitting conflict with censure is waged, and a vicious circle of subconscious mental processes is established which may work havoc with the mind. As the victim projects his own defects upon others he may become anything from the captious critic to the pestiferous agitator or mayhap the paranoiac.

Such may be the result of discontent. Extreme cases perhaps develop only in those who are psychopathically disposed. Less pronounced cases, in which individual and friends are involved in distresses which rob life of much of its enjoyment, are quite too common.

The clinical significance of the reactions to discontent, while extremely difficult of definite appraisal, would appear to be of sufficient importance to merit careful investigation. Perhaps in no other line of research is the student so beset with

puzzling problems or so apt to be led astray by some alluring will o' the wisp. We should not be too impatient if practical results are slow of realization. Psycho-analysis may be developed into an effective curative procedure. But for the present we have greater reason to hope for the disclosure of practicable means of prevention. And the achievements of mental hygienists in closely comparable undertakings give us warrant for the belief that even in this obscure field the patient continuance in well doing will ultimately bring ample reward.

W. H. HATTIE

THE DIFFICULTIES OF RESEARCH

THREE years ago the scientific world lost one of its most brilliant younger men in John Ervine Hunter, of Sydney, Australia. Few men have made for themselves at so early an age so high a reputation for scientific research, and those who were fortunate enough to meet him and hear him lecture on his visits to Canada and the United States, will remember well the clearness of his teaching, and the evidences he gave of intellectual powers far above the average. All the more was this apparent in the ease with which he dealt with one of the most difficult problems in physiology, namely, the part played by the sympathetic nervous system in the tone of skeletal muscle. It has continually baffled physiological workers, but under Hunter's guidance its intricacies were unfolded with a lucidity which was as attractive as it was masterly; and his work seemed to bear promise of much fruit in surgery.

Since then, however, this particular line of research has not developed in accordance with that promising start. Hunter's conclusions seemed unassailable; the surgical operations evolved from them by his colleague Dr. N. D. Royle appeared to be successful. And yet, as the result of further experience and critical analysis, we now find these conclusions disproved and their application to surgery of no avail. We have already given details of these criticisms,* and will here do no more than reflect on the peculiar difficulties that beset investigations in physiology. John Hunter like many other of our intellectual leaders, has been found to be not infallible, but so much the more do we mourn his premature death. We have no doubt that if he had lived, the present confusion into which our conception of muscle tone has relapsed, would not have come about. Either he would have forestalled the critical dissection which has shown that his views were erroneous, or else he would have directed the investigations to a happier issue.

As it is, we know now that we have seen the filling of another page in the history of physiology with the story of a search which if not entirely unavailing, is apparently further from its goal than when it was being illuminated by the genius of young John Hunter.

H. E. MACDERMOT

* *Canad. M. Ass. J.*, Nov., 1926, xvi, 1363.

THE BASAL METABOLISM AFTER THE ARTIFICIAL MENOPAUSE*

SINCE the time of Aristotle and Galen, observations and experiments too numerous to number, have been recorded on the changes accompanying the menopause whether it be physiologically or artificially produced. In spite of all this work, much remains obscure and much of the data, as recorded, is contradictory.

That the menopause is usually accompanied by an increase in weight, was an

* John T. King, *Johns Hopkins Hosp. Bull.*, Balt., Nov., 1926, xxxix, No. 5.

observation of Galen's, who in his writings states that "female hogs after castration become swollen and fat." More recently Loewy and Richter showed a drop in oxygen consumption in dogs after castration of 18 per cent per kilo of body weight per minute, with a coincident increase of 10 per cent in weight. By feeding the dog "oophorin" postoperatively the metabolism rose, but fell again after the extract was discontinued. Luethje, on the other hand, in comparing the metabolic processes of a normal and a castrated dog, found no significant difference in the CO_2 outputs in five months. Murlin and Bailey support the work of Loewy and Richter that there is a reduction in metabolism after castration.

The German school has carried on similar work on women. Kraul and Halter who studied five women in whom the menopause had been artificially produced by x-ray, shows a reduction in metabolism of 17 to 30 per cent. Plant and Timm have demonstrated that this fall is only temporary; the metabolic rate returns spontaneously to normal after several months. They believe that hyperfunction of the thyroid explains this rise. Still another writer, remarks that the fall in metabolism is seen only in stout women.

That the literature on this subject is contradictory may be best shown by the impressions of two recent reviewers. DuBois says "a total absence or diminished function in the sex glands only exceptionally causes a diminution in the oxidative processes". Aub and Bailey on the other hand came to the conclusion that gonadectomy is followed by a fall in metabolism.

This present study was undertaken with the hope that some light might be thrown on the nature of the menopause, and that some of the contradictory data might be explained.

The metabolic rates of women in the different decades who were still menstruating were taken, and used as checks as well as the Sage Institute Standards. Then rates were taken in women following unilateral oophorectomy, bilateral oophorectomy and hysterectomy alone, and any increase or decrease in weight noted. The result of the study showed a substantial gain in weight in a large percentage of all cases, although it was more marked in those in whom a bilateral oophorectomy was done. The basal rate was rarely affected by these pelvic operations; when there was a drop the possibility of its being a coincidence rather than a consequence must be considered. The possibility of a temporary drop in basal rate following oophorectomy is not ruled out, since all Dr. King's observations were made at least a year postoperative. It is concluded therefore that following the menopause there is an increase in body weight, without corresponding change in metabolism and that the increase in weight is probably due to decreased vigour. ELEANOR PERCIVAL

SPERMINE

IN 1678 Leeuwenhoek, peering down the grandfather of microscopes, observed certain "glittering translucent" crystals separating from human sperm, and drew a rough sketch of them in the celebrated letter in which he communicated to the newly-formed Royal Society his discovery of spermatozoa. The French chemist Vauquelin rediscovered these crystals in 1791, and thought them to be calcium phosphate. His description of their formation, recorded in Fourcroy's "Chemistry" (English translation 1804), is accurate enough to record. "Exposed for some days in a capsule to air . . . . . the sperm becomes covered with a transparent pellicle, and deposits transparent crystals about two millimeters in length, frequently crossing each other, and arranged like the spokes of a wheel. Seen through a magnifying glass, these crystals present a prism of four sides, termin-

ated by a pyramid with four faces, very much elongated." The crystals were once more rediscovered by Böttcher in 1865, and he considered them to be protein in nature. Schreiner examined them in 1878 and reported that they were the phosphate of a new organic base, to which he gave the formula C_2H_2N. The name "spermine" which is now used for this base was apparently given to it by Ladenburg and Abel in 1888.

Many subsequent investigators were unable to isolate the crystals and disbelief in their existence grew. Nor was this disbelief combated by the extravagant claims of the Russian physiologist von Poehl, though he actually isolated the crystals, and ascribed to them an approximately correct formula in 1891. But he endeavoured to exploit the material commercially as a valuable therapeutic agent and published some valueless books on the subject. His commercial preparations have been found to contain a *trace* of the base.

Though these crystals were observed two and a half centuries ago only within the past two or three years have systematic researches been carried out on their nature and distribution. The work has been done by Otto Rosenheim in collaboration with H. W. Dudley, chiefly at the Medical Research Institute in London.*

According to Rosenheim "the appearance of the characteristic crystals can best be followed under the microscope by mounting a drop of fresh semen on a slide under a coverslip. The shortest time of their appearance is from about forty to sixty minutes, after the semen has undergone the peculiar rapid change from the viscid tenacious condition into a thin watery fluid. Since spermine phosphate as such exists in testis and other organs, its crystallization from semen is most easily explained by changes in temperature and hydrogen ion concentration." He states that the average length of the crystals is a quarter of a millimetre, though crystals up to two millimetres in length may occasionally be seen.

Spermine has now been isolated from semen, pancreas, liver, kidney, ovary, muscle, spleen, lung, brain, testes, thymus, adrenal, and thyroid, the amount of the phosphate varying, in descending order for these tissues, from 0.26 to 0.003 per cent. In different yeasts the amount varies from 0.04 to zero per cent. The fact that the spermine phosphate is present in ovarian tissue and in yeast indicates that it is in no way a specific internal secretion of the testis. It is absent from bull's semen, from eggs, and from milk, so that it does not appear to be essential to fertilization, growth, or development. It cannot replace vitamin B, and does not function as a co-enzyme in yeast formation. Evidently our present knowledge of its function consists simply of negative facts.

The empirical formula of spermine is $C_{10}H_{26}N_4$. Dudley, Rosenheim, and Starling have just succeeded in determining its structure and synthetizing the compound. Its formula is

$$NH_2.(CH_2)_3.NH.(CH_2)_4.NH.(CH_2)_3.NH_2.$$

This peculiar basic substance is so far unique of its kind in living tissues, though it resembles such putrescent, bacterially formed compounds as putrescene, $NH_2.(CH_2)_4.NH_2$, and cadaverine, $NH_2.(CH_2.)_5.NH_2$, being actually a chemical derivative of the former. Its wide distribution, and its strong reactivity certainly suggest a definite function. The authors state that Professor Gibbs, working in the same Institute, is at present studying its pharmacological properties, and his results will be awaited with considerable interest.

A. T. CAMERON

* Otto Rosenheim, *Biochem. J.*, 1924, xviii, 1253-62; H. W. Dudley, Mary C. Rosenheim, and O. Rosenheim, *ibid.*, 1263-72; H. W. Dudley, and O. Rosenheim, *ibid.*, 1925, xix, 1032-3, 1035-6; H. W. Dudley, O. Rosenheim, and W. W. Starling, *ibid.*, 1925, xx, 1082-94.

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EPIDEMIC POLIOMYELITIS IN ENGLAND

SINCE the brief statement in our last issue regarding the presence of acute poliomyelitis in England and Wales the disease appears to have assumed an almost epidemic character in some areas, and reached the total of 319 new cases in October. Fortunately the number fell to sixty-five new cases during the first two weeks of November. This decline is in accordance with previous experience. The disease usually reaches its greatest prevalence during the late summer and autumn months and declines at the beginning of winter. Statistics given by the Minister of Health on November 23rd in the House of Commons indicate that its incidence greatly increased all through Europe during the latter half of 1925, but during the past six months of 1926 the disease has apparently on the Continent been on the decline.

With this epidemic persisting in the way it has done throughout Europe and England it is possible that next summer it may make its appearance in many parts of America. It is a disease always to be regarded with particular anxiety by the physician for it is impossible to say in a given case whether the crippling and disabling sequelæ will make their appearance in a mild or an aggravated form. Unfortunately, there is also a clinical type in which the early febrile symptoms are so trifling as to escape much notice, amounting in some instances to nothing more than a headache, and it is in such cases that the fulminant onset of paralysis is not infrequently the first symptom to indicate the serious nature of the disease. The physician should remember that with the presence in the vicinity of other cases of the disease an attitude of watchful and solicitous care should be adopted in all cases of indefinite febrile malaise. Several instances in which the disease undoubtedly was conveyed by carriers have occurred in Great Britain, so that in any instance in which we find some stiffness of the muscles at the back of the neck, with a slight rise of temperature, pains in the limbs and distinct tenderness of the muscles, the child should immediately be put to bed. Lumbar puncture should at once be performed when definite suspicion is aroused. We have as yet no specific for the disease. Sir Robert Jones considers the best treatment may be summed up in one word—*Rest*. It has been definitely established that the disease is infectious and the Ministry of Health in England expresses the opinion emphatically that it is important to isolate all patients in the acute stage, whether the manifestation of the disease is slight or severe. Unfortunately, the disease broke out in several schools in England. In the Uppingham School the action taken was to close the school, and send the boys to their homes in all parts of the country. In the schools in which it broke out in Kent, the schools were definitely isolated and the students were confined entirely to their grounds. Lord Dawson of Penn and Dr. Collier both protested against the dispersion of the scholars in the case of the Uppingham School, but judging from letters appearing in the *Lancet* there is a decided difference of opinion in the matter. Lord Dawson mentions an instance of a girl being infected with the disease by a boy who was taken home by his parents from one of the Broadstairs schools. The policy firmly advocated by the British Board of Health is to isolate the patients absolutely, and to keep all other inmates of the school under systematic daily medical supervision, not forgetting that adults may also be attacked. The following letter from Sir Robert Jones appears in the *British Medical Journal of* November 27th.

We are accustomed to look upon the first stage of the disease as extending from the onset until all pain has disappeared. If there is no pain or very transient pain it is wise to consider the first or acute stage as lasting six weeks, but so long as pain, or tenderness of the muscles lasts we must regard it as an indication of active irritation of the central nervous system.

During this acute stage it is essential that the child be kept at rest. He should not be allowed to roll and twist in bed. The head, spine, and limbs should be held rigidly by a simple apparatus softly padded to ensure comfort. This Fabian policy may be trying to both doctor and patient, but it is certain that the child is in considerable danger from premature massage and electricity. In the presence of acute symptoms it is dangerous to stimulate the peripheral ends of nerves connected with hæmorrhagic and inflamed centres. The room should be kept quiet

and darkened, and nothing should be allowed likely to cause excitement. Not long ago, in consultation with distinguished physicians abroad, I saw a child in the acute phase of poliomyelitis. The physiotherapist, with all his apparatus, was already in the room in order to test the muscle reactions, while the child lay unprotected on the bed rolling and screaming in terror. Such an episode is a tragedy, and reflects grave discredit on our profession.

The other point upon which I would lay emphasis is that the paralysed groups of muscles during the whole of the acute stage and until recovery has taken place, should be kept in the position of relaxation—that is, the limb should be kept extended if the quadriceps is paralysed; the foot inverted where the tibial group is affected; the ankle plantar-flexed where the calf muscles are paralysed; and on the same lines where other groups are involved. This is based on a fundamental principle which admits of no exception.

In conclusion, I wish to subscribe to all you say in regard to the closing of schools. With the knowledge we have of the infectious nature of the disease and its spread in the United States, there can be no justification for sending 500 boys all over the country, some of whom may well be carriers of disease.

ON AUTOMOBILE ACCIDENTS

THE number of persons killed in automobile accidents appears to mount higher and higher every year. The National Bureau of Casualty and Surety Underwriters report 22,500 persons killed last year. While the press informs us that there are a million more new automobiles and hundreds of miles more of good roads opened to the public, yet there is no governmental investigation of the fitness of the drivers of these possible engines of destruction and death. In a recent collision in Chicago in which four persons were injured the police discovered that the driver most at fault had crippled legs, and it is stated* that among the millions of public automobile drivers there are many with glass eyes, deaf ears, paralyzed limbs, and all sorts of pyschoses. It is with much interest, therefore, that we note in Holland a committee has been appointed to study the necessary qualifications to be insisted upon for all those driving an automobile.

It is proposed to distinguish two classes, the public chauffeurs and private chauffeurs, as it seems desirable to place the requirements for public chauffeurs somewhat higher than those for private chauffeurs. The following has been proposed as an irreducible minimum: an age requirement of at least eighteen or nineteen years; a freedom from disease, physical, or mental, that might suddenly incapacitate a person driving; the adequate functioning of all four limbs; visual acuity of at least 50/100 in each eye without correction; stereoscopic vision adequate for the judging of distances; a normal visual field; satisfactory colour vision; absence of day or night blindness, and auditory acuity representing an audition equal to hearing a whisper at a distance of fifty centimetres. A tendency to alcoholism, and the existence of epilepsy and any psychic disease should be prohibitive. Cardiac arrhythmia should not necessarily disqualify an applicant, but advanced arterio-sclerosis is incompatible with the responsibilities of a chauffeur. An examination of the lachrymal ducts is also desirable, as the watering of the eyes may interfere with vision. They also recommend an examination of the reflexes and the power of giving prompt attention. It is our conviction that every driver of an automobile should pass tests similar to the above before any license for driving, at least, the higher and more powerful grades of automobiles is granted.

In reference to the treatment of accidents due to automobiles the *British Medical Journal*, Nov. 27, p.1002, in an Editorial writes as follows:

"The frequency of these road accidents is causing a serious disturbance of hospital bed accommodation. Beds that were intended and are needed for the sick poor are occupied by the victims of motor cars. We hear of hospital wards where there is no room for appendix cases because all the beds are occupied with accident cases. Again, the finances of the hospitals are disturbed. Funds that were given by benefactors for the sick poor are diverted to the relief of those well able to pay for their treatment or for whom insurance should provide. The doors of the hospitals are rightly ever open to the call of the injured, whether

* *J. Am. M. Ass.*, Chicago, Nov. 6, 1926, lxxxvii, 1560.

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he has fallen amongst thieves or been mangled by a car. But, unlike the good Samaritan, who paid his two pence to the innkeeper for the care of the injured stranger, those concerned with the victims of motor smashes too rarely remember the cost to the hospital, and the skill and care of the hospital doctor.

"The subject of the attitude hospital authorities should take up with regard to cases of accident admitted to their wards when the injured person is insured was considered at the Annual Representative Meeting of the British Medical Association in 1925, and again this year. The opinion was unanimous that in all such cases where medical attendance is covered either directly or indirectly by insurance, the hospital authorities should recover from the insurance company the full cost of maintenance and treatment of these patients. The Representative Body also recorded its opinion that where patients, who would ordinarily be considered as private patients, are admitted to hospital solely on account of accident or emergency, they should be considered "private patients." Members of the staffs of hospitals will no doubt be glad to quote this expression of opinion by the Representative Body to reinforce advice they may themselves think it proper to give to the boards of their hospitals."

Editorial Comments

ON MEDICAL WRITING

From an interesting chapter in a small volume written by the editors of the *Journal of the American Medical Association* on "The Art and Practice of Medical Writing" we abstract the following:

"Sir J. Clifford Allbutt in his book 'Notes on the Composition of Scientific Papers' tells us that it was his custom to make at least four drafts of a manuscript before he considered it ready for the printer. The first draft was compiled from the notes that had been carefully collected on slips and arranged in logical order. Redundant words, phrases and sentences were then deleted. Sentences out of position for coherence or logical development of thought were moved to better positions, as second thoughts are better than first thoughts. In the next revision sentences and paragraphs were recast to make clearer the thought they contained, and the manuscript was then put aside for a few weeks; then reread with refreshed attention, and the final corrections were made."

"Many physicians have envied Sir William Osler his power of writing clearly. In the Osler library is a collection of some of his manuscripts showing the various stages in their preparation. First are notes on paper of various kinds, evidently written on trains and at opportune moments; then a rough outline in longhand; next, the first typewritten copy with interlineations, transpositions, and deletions; then the second typewritten copy, which also bears evidence of much modification, and finally, a third typewritten copy which after it was reread was sent to the printer."

An editorial in a recent number of the *British Medical Journal* says "To have a manuscript typewritten, and then to send it for publication without revision is a crime comparable to operating with unwashed hands." The results of revision are always apparent in the shortening of the manuscript, and in the increased strength of tone it possesses.

The editors of the majority of modern medical journals also emphasize the importance *of having the first, not the carbon copy, and of having the writing double spaced.* The editor of the *British Medical Journal* adds "Would that we could persuade all our own contributors to take it from Dr. Simmons that there really are *practical reasons why editors prefer good clean copy; not a carbon copy.*"

SEQUELÆ OF ENCEPHALITIS LETHARGICA IN CHILDREN

In a paper by Virginia Saunders-Jacobs, which appeared in the *Journal of State Medicine*

for October, 1926, the author reviews the symptoms which have been observed in about one hundred post-encephalitic children, in many of whom the diagnosis was made after the subsidence of symptoms which had previously led to other diagnoses, such as influenza, chorea, meningitis, or merely slight colds. The post-encephalitic symptoms are described under (a) mental changes, which varied from slight alterations in disposition and behaviour to acute homicidal insanity; (b) disorders of sleep, notably inversion of the sleep rhythm—sleepiness during the day, wakefulness and restlessness at night; (c) Parkinsonism, of varying grades, even in young children; (d) localizing nerve signs and symptoms, of which ocular disorders (diplopia, strabismus, occasional nystagmoid jerks, pupillary changes, ptosis) were most common, although unilateral partial facial palsies, various paralyses of limb muscles and changes in reflexes also occurred; (e) excito-motor phenomena, such as bradykinesia, choreiform movements, myoclonia movements and various tremors; (f) metabolic disturbances, including obesity, wasting, polyuria, thirst and anæmia; (g) respiratory disorders, manifested in various forms of dysrhythmia, which affected 10 per cent of cases. Dr. Saunders-Jacobs concludes her paper as follows:

> The foregoing remarks show clearly that encephalitis lethargica presents many further problems to the practitioner, in addition to the one of bringing the patient through the acute stage of the disease, for survivors may tread the downhill path towards complete physical and mental helplessness. The prognosis of these cases is uncertain and the treatment is still under investigation. No cure has, so far, been discovered. Various drugs have been tried with a certain amount of success. Massage and electricity have been found helpful, and these, together with efficient control, fresh air, good food, and skilled teaching, are all being employed. It is, however, still a case of working largely in the dark.

Meanwhile, it is desirable that practitioners, and public health authorities, should familiarize themselves with the picture presented by early cases of post-encephalitis, as an aid in retrospectively diagnosing this dread disease.

The Lister Memorial Committee of the Canadian Medical Association has approved a circular letter addressed to all hospitals and medical societies, suggesting that April 5th, the anniversary of the birth of Lister, be observed in some appropriate manner as "Lister Day." This letter appears in this issue in the section devoted to correspondence.

Men and Books

A CHAPTER IN THE HISTORY OF PATHOLOGY

In the history of science, as of peoples, certain 'high spots' stand out prominently above the dead-level of the commonplace. The history of pathology is no exception. One of these arresting features is a modest little book, of hardly more than one hundred pages, first published in 1507. It is entitled *De abditis nonullis ac mirandis Morborum et Sanationum Causis Liber*. Its author, Antonio Beniveni by name, was, be it noted, a general practitioner and not a professor. But little is known of him, unfortunately, though we can infer somewhat, with some accuracy, in regard to his character and attainments from his work. He lived and worked in Florence in the spacious days of Lorenzo the Magnificent, dying in 1502. He was a friend of Marsilio Ficino and Angelo Poliziano, a companion of scholars, from whom he imbibed much of the old Greek spirit. He was, in consequence, a keen observer and a careful and successful practitioner. He jotted down brief notes of his more important cases, one hundred and eleven in all, which are interesting and improving reading. His note book was found after his death, and published by his brother Geronimo, who had acumen enough to realize its value. We see that Beniveni was a morbid anatomist as well as a clinician, and here, for the first time in modern medical literature, do we find records of autopsies done for the express purpose of ascertaining the cause of death. One could wish that we had more detailed information about the work of Herophilus and Erasistratus and the other Alexandrine anatomists, who, in the course of their evidently numerous and extensive dissections, must have come across many interesting morbid conditions. But this is lacking, and, until the time of Beniveni, we have practically no references to this subject in the writings of mediaeval anatomists.

The headings of his chapters, to quote only some, give a good idea of the range and extent of Beniveni's practice:—Of the Disease commonly called Gallic: Stones found in the Gall-bladder:

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Urine evacuated ex ano: Water in the skin: A large and heavy Goitre: A stone ejected from the Intestines: An Ulcer of the Chin cured by the removal of a tooth: A Lightning Stroke: Retained Menses cured by Incision: A dead Foetus extracted by a Hook: A Child born with imperforate Anus: A Woman almost dead from loss of Blood: A Girl recovers her Sight after Perforation of the Eye: An Arrow removed from the Shoulder: Elephantiasis: Morbus Coeliacus cured: Twin Children (Monster).

His longest section deals with syphilis, then a new disease, of which he gives a good description. Among the many remedies for it, which he mentions, it is interesting to find mercury included. A curiosity is a case of empyema cured by evacuation of the pus with the urine. Another is the case of a woman who swallowed a needle, which ten years later, was evacuated through a small fistula.

Beniveni appears to have been a bold and resourceful surgeon. He speaks of removing a tumour from the hip, weighing more than sixty pounds, a case which no other surgeon would touch, by chain ligation followed by the cautery, and with complete success. Perhaps the most interesting is case No. xxxviii. He calls this angina, though he states that there was no swelling of the throat internally or externally. Inasmuch as the patient regurgitated what he ate through the nose, there is little doubt that this was a case of diphtheria, and, probably, laryngeal, as there was much difficulty of respiration. Beniveni opened the neck, apparently doing a tracheotomy, and, if so, this is the first recorded instance of this operation since the days of Antyllus, fourteen hundred years before.

The autopsy records are very brief, but deal with some interesting conditions, such as abscess of the mesentery, thrombosis of the mesenteric veins, gall-stones, heart-disease, including one case of *cor villosum*. A pious man, Beniveni gives several instances of faith-healing, by means of prayer.

While clearly a Galenist, Beniveni is, for his time, singularly practical, and does not let his theory run away with his common sense.

A. G. NICHOLLS

THE CENTENARY OF LAENNEC

Rene-Theophile-Hyacinthe Laennec was born in 1781, and died just one hundred years ago. Few men in medicine have made for themselves a more illustrious name, and fewer still have done so at such an early age. He was, for example, only twenty-one when he set forth the first clear clinical and pathological account of peritonitis: and this was accompanied by original anatomical work, such as the description of the sub-deltoid bursa, and the fibrous capsule of the liver.

The work, however, which set him in the front rank of clinicians was his *Traité de l'auscultation mediate*, which grew largely from his discovery of the stethoscope. The term Laennec's cirrhosis is familiar to most students, but it is a little significant that his name has not been directly incorporated with his instrument. It might be too strong a temptation for many to resist such a perpetuation of their name, but Laennec was only concerned that if it should be named at all (for he himself would only refer to it as his "cylinder") it should be with a name which was descriptive without being awkward; and it was only when he found that it was in danger of being referred to by such a term as "thoraciscope," that he gave it the present name.

And yet, his discovery of so valuable an instrument as the stethoscope is not his chief claim to our veneration. Men like Laennec have an influence in medicine far greater than is represented by their additions to our mechanical aids. It was his intellect and character which raised him above his fellow workers and make the centenary of his death worthy of commemoration. He died at the age of forty-five, a victim to the phthisis of which his portraits are only too clearly suggestive. But they also convey some idea of his alert and brilliant mind, which interested itself keenly in classics as well as in medicine, and in outdoor sports and natural history and music. As Dr. Thayer has remarked: "No one with an upper lip like his could fail to play the flute!"

The art of physical diagnosis was hardly in existence before Laennec. He gave it an impetus whose extent can still be detected, and his centenary is a fitting moment to recall the high qualities which made him capable of doing so.

H. E. MACDERMOT

THOMAS ADDISON

A full and interesting account of the life of Thomas Addison appeared recently in a number of Guy's Hospital reports* written by Sir William Hale-White who thus has completed the biographies of three contemporary medical heroes, Bright, Hodgkin, and Addison, all of whom were physicians to the famous Borough hospital..

Addison was born in 1795. Intended at first for the legal profession, the intention was changed and he went to Edinburgh as a medical student, and while there it is said he did not show evidence of great talent. After graduation he first obtained the position of house surgeon to the Lock Hospital in London, and later on became physician to the General Dispensary in Hatton Garden, where he learned dermatology from Bateman, the successor of the great Willan. He

* W. Hale-White, *Guy's Hosp. Reports*, 1926, lxxv, 253-279. *Brit. M. J.*, Oct. 2, 1926.

was elected as assistant physician to Guy's Hospital in 1824, and became full physician in 1837. Addison as portrayed by Sir William Hale-White was an excellent teacher, strong and dogmatic, and his position at Guy's was equal to, if not superior, to that of Sir Astley Cooper, while his personal influence was greater than that of Bright. His strong position at Guy's Hospital was in marked contrast with his standing in the outside world, both medical and lay. At the Royal College of Physicians he had to wait nineteen years before being made a Fellow. He was never a censor, nor did he ever hold any lectureship or office. No Court appointment or honorary degrees were conferred on him, and most surprising perhaps of all the Royal Medical and Chirurgical Society refused to publish some of his papers even after he had been its president. When he died neither the *British Medical Journal* nor the *Lancet* published an obituary notice. It is indeed sad to note that none of his discoveries brought him fame during his life, although many were named after him, such as Addison's disease, Addison's anæmia, Addison's keloid, etc. His name is permanently impressed on medical literature. To him we are indebted for our knowledge of the morbid anatomy of pneumonia, the clinical signs of a fatty liver, the mixed infective character of the lesions in pulmonary tuberculosis, and the skin disease known as xanthoma.

IMHOTEP: FIRST ANCIENT PHYSICIAN

Dr. Jamieson B. Hurry, well known for his work on *Vicious Circles in Disease,* has now struck out a new line in a very readable and carefully documented account of Imhotep*, the Vizier and physician of King Zozer and afterwards the Egyptian God of Medicine, who according to Sir William Osler is the first figure of a physician to stand out clearly from the mists of antiquity. Zozer was a Pharaoh of the third dynasty, 2980 to 2900 B.C. His pyramid at Sakkarah near Memphis is familiar to visitors of the Nile, and was designed for his royal master by Imhotep, who was not only the earliest philosopher and wise man known to the world, but was also a notable architect, an eminent writer, an astronomer, and one who had a high reputation both as a magician and as a physician. The dates of Imhotep's birth and death are unknown. His father appears to have been a famous court architect, but he was regarded as the son of the god Ptah. He became a medical demigod about 580 B.C., and his apotheosis as a full god of medicine occurred about 525 B.C. when Egypt became a Persian province. Dr. Hurry devotes a special chapter to ancient Egyptian medicine in order to show the extraordinary development of the healing art that had been reached in that country. The practice of mummification and embalming rendered visceral anatomy familiar. The excess of specialism described by Herodotus appears from recently discovered tablets to be an incorrect picture of what actually existed.

* Imhotep, Vizier and Physician of King Zozer, afterwards the Egyptian God of Medicine. By Jamieson B. Hurry, M.A., M.D., London, Humphrey Milford, Oxford University Press. *British Medical Journal,* October 16, 1926.

HARVEY AND WITCHCRAFT

The following story is told in Professor Notestein's *History of Witchcraft in England,* based on a letter in the *Gentleman's Magazine,* 1832, Part I, 405–410, that about 1635 a justice of the peace in south-west England, whose name is unknown, wrote a letter in which he said that he once asked Harvey his opinion on witchcraft. Harvey replied that he believed there was no such thing, and related a story of a visit he made to a reputed witch when he was at Newmarket with King Charles I. The woman lived in a lonely house on the borders of the heath. Harvey told her that he was a wizard, and had come to converse with her on their common trade. The woman believed him, because, as Harvey said, "You know I have a very magical face. "Harvey asked to see the witch's familiar; whereupon the woman brought out a dish of milk, made a chuckling noise, and a toad came out from under a chest and drank some of the milk. The witch was persuaded to go out to get some ale half a mile away, and while she was absent Harvey cut up the toad and found the milk inside. He came to the conclusion that the animal "no ways differed from other toades," but that the old woman, having tamed it, had come to believe it a spirit and her familiar. On her return the old woman "flew like a Tigris" at Harvey, and would not be pacified with money; so that Harvey was obliged to tell her that he was the King's physician sent to discover if she were a witch, and in case she were to have her apprehended. Dr. Fairfield thinks that this is "the only scientific examination on record of that unique and mysterious feature of English witchcraft, the 'domestic familiar' "; and he agrees with Professor Notestein that the episode may have influenced Harvey in favour of the Lancashire women.—*British Med. Jour.* Oct. 2, 1926.

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Reports of Societies

ANNUAL MEETING THE CANADIAN NATIONAL COMMITTEE FOR MENTAL HYGIENE

Dr. Charles F. Martin, President of the Canadian National Committee for Mental Hygiene, presided over a largely attended annual meeting in the ball-room of the Ritz Carlton Hotel, Montreal, December 3, 1926, when an address was given by Dr. George E. Vincent, President of the Rockefeller Foundation on "Public health and mental hygiene."

Before introducing the speaker of the day Dr. Martin referred to the work of the National Committee. In the course of his remarks he said: "Eight years have passed since the inception of this Canadian National Committee. Eight years, I think, of conspicuous achievement. Originally fostered by the generosity of a number of Canadian citizens, it has been sustained by their continued co-operation and by their sympathetic interest.

"Despite the universal attention which this movement has received, there seems to be still some confusion in the minds of the people as to what is exactly meant by mental hygiene. May I say that the mental hygiene movement or mental health movement is concerned first with the conservation of mental health, secondly with the prevention of mental disorders in the very widest sense, and thirdly with the treatment of those disorders when they arise. The mental hygiene movement has a very broad application. It concerns not individuals alone, but it concerns communities, it concerns large cities, and indeed it concerns nations. It was for this reason that the National Committee in Canada was formed, calling to its aid not alone doctors, but also universities, teachers, social workers and health officers. Leaders in almost every sphere of life can be useful in such an organization as this.

"I will not go into details as to the achievements of the last few years. Let me say, however, that the progress has been marvelous. Under the stimulus of the Canadian National Committee, governments, federal and provincial, have been stimulated to further interest in this whole mental hygiene problem. Mental hospitals have been built throughout the country under their ægis. Governments have not only built hospitals and institutions, but they have stimulated in schools the development of the care of subnormal children, and they have done many other things too detailed to relate here. Suffice it to say that we have had the co-operation of the governments in practically all the provinces of the Dominion. They have spent many millions of dollars throughout the country under the influence of this mental hygiene movement, and seeing what has developed under that expenditure, they are willing to go further and spend still more.

"So we are indebted to governments for their hearty co-operation. I have already said we are indebted to citizens for their support and sympathy, and to the Metropolitan Life Insurance Company for its financial aid and interest with reference to parental education. And lastly we are indebted to a very substantial extent to the Rockefeller Foundation, not alone for its financial assistance which has been generous at all times, but also for the inspiration that their interest has given the Committee, and we are again to-day indebted to the Rockefeller Foundation inasmuch as the President comes to us to speak."

Address by Dr. George E. Vincent

In opening his address on "Public health and mental hygiene" Dr. Vincent said: "Let us frankly admit that public health is a tiresome subject. I have a great deal of sympathy for the young woman who wanted to add a clause to the Litany 'From wholesome food and worthy young men Good Lord deliver us.' Health in the individual is an uninteresting subject. When we are young we are bored to death with talk about symptoms, and when we grow older and have symptoms ourselves we become terribly interested and our chief anxiety is to tell others about them. The sanatorium is largely the clearing house for symptoms. You go there with a sort of understanding that you can talk about yourself, and if there is time perhaps, give a little chance to others to say a very little about themselves.

"If individually it is tiresome, it is even more so when it is a question of public health. Its large and portentous ideas and its generalities are a tiresome subject. The average person is willing to take it for granted, and he only objects when it interferes with his personal comfort and when he has to pay the taxes."

Dr. Vincent outlined the development of public health. He said: "There have been definite stages through which public health has been developed. If you have a community that has not any public health at all, and has

the highest possible death-rate and you invest a dollar, you get a vaster return from water supply and sewage disposal than from anything else you can do. And when you have invested money in sanitation and get splendid results, you start in with the control of communicable diseases, and that is a more difficult matter."

Dr. Vincent intimated that communicable diseases were fast being brought under control, and that the third stage of public health was concerned with individual acts—was concerned with hygiene. "These are the days of the making of many hygienes" said Dr. Vincent. "Almost every morning you find another kind advocated. There is infant hygiene, maternity hygiene, pre-school hygiene, school hygiene, industrial hygiene, social hygiene, and now we have mental hygiene. This is the latest one. This is the one which is most fascinating, this is the one we have met to talk about to-day. A very significant and important thing to remember is that these various hygienes and the control of communicable disease and the sanitation of the environment are all part of one movement. The idea that you can touch any of them, that you can deal with or dwell on one to the exclusion of others, the idea that you can develop any one of them very far until you have developed others, is one of the greatest fallacies, and what is termed mental hygiene permeates all the other hygienes."

The speaker illustrated the way in which mental hygiene permeates maternal hygiene and industrial hygiene and spoke of its work in Canada and the United States in dealing with the insane, feebleminded and delinquent. He described vividly the work of child guidance clinics, of mental hygiene projects in schools and universities, and of enterprises for the training of parents in child rearing. According to Dr. Vincent mental hygiene has come to stay. "It has come to develop; it has come as one of the most important and fascinating, and let us frankly say, one of the most immature of all the forms of social inquiry."

The survey and research work of the Canadian National Committee was commended by him. In answering the question as to whether the Committee should conduct independent research or co-operate with universities he said that there was no doubt as to the answer. This Committee has adopted an enlightened, and statesmanlike policy, with the establishment of permanent enduring centres of research activity and practical application, of basic principles in the work carried on.

In concluding Dr. Vincent said, "I congratulate the committee under whose auspices this work is going on, and this community on the support which you have given to the committee, and on the soundness of the programme which has been inaugurated, and I am confident that day by day, month by month and year by year, steadily, without show, without pretence, without boasting, you will carry this work on and will not only make conditions better in your own communities and throughout the Dominion, but by making contributions to this subject you will contribute to the work of all the other countries and that gradually there will be, due to our knowledge, a deeper insight into human nature, a better understanding of how human nature can be given conditions of life that are more stimulating and more wholesome."

A vote of thanks to Dr. Vincent was moved by Sir Arthur Currie, Principal of McGill University and seconded by Professor E. W. Ryan of Queen's University, Kingston.

Report of Medical Director

The report of Dr. C. M. Hincks, Medical Director of the committee furnished an outline of the general aims of the organization, of the methods adopted for carrying out the work, and of results achieved. It also contained a statement of financial policy. The present activities of the committee are as follows:

1. A survey of mental deficiency in Nova Scotia at the request of the provincial government. Indications point to the inauguration of a constructive programme for the feeble minded as a result of the study.

2. Association with the Manitoba government in making provision for a travelling clinic service in Manitoba. For the next twelve months special attention will be directed to the problem of mentally deficient children in school attendance.

3. Co-operation with the Mental Hygiene Commission of British Columbia in a quest for information concerning the possibilities of prevention and consequent reduction of institution costs.

4. Co-operation with Mental Hygiene Clinics in five cities to improve the service rendered to the public.

5. Co-operation with the Divisions of Child Study in McGill University and the University of Toronto in conducting experiments in parent training in child development, and in the training of leaders for the work. (Ten parent training groups have been organized successfully.)

6. Co-operation with the University of Toronto and McGill University, Montreal, in conducting nursery schools of the laboratory type to study the development of pre-school age children.

7. Employment of a research group in co-operation with McGill University, Montreal, to study nervously predisposed children and, in addition, to conduct investigations in the field of juvenile delinquency.

8. Employment of a research group in co-operation with the University of Toronto to dis-

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cover ways and means of applying mental hygiene principles to children in school attendance.

9. The conduct of an educational programme in mental hygiene through the issuing of a bulletin, the showing of an exhibit, the delivering of many addresses and the publication of articles in newspapers and magazines.

10. Arrangements for members of the staff to travel across Canada ot keep in touch with mental hygiene developments and to stimulate progress.

11. By arrangement with the Rockefeller Foundation and the Laura Spelman Rockefeller Memorial, the securing of fellowships for Canadians to study mental hygiene abroad.

12. Educational activities in New Brunswick.

C. M. HINCKS

MEETING OF MEDICAL OUTDOOR STAFF, TORONTO GENERAL HOSPITAL

EXHIBITION OF AND DISCUSSION ON CASES SEEN IN THE HOSPITAL

At the November meeting of the medical outdoor staff of the Toronto General Hospital with Dr. George Young in the Chair the exhibition of interesting cases seen in the service took place. Dr. A. G. McPhedran showed a case in which the diagnosis of a pure mitral regurgitation had been made seven years previously. The case had been followed carefully up to the present time. Within the last few months the signs of stenosis had made their appearance and could be readily appreciated when the patient lay on his left side. The case was of interest, in that it exemplified the usual coexistence of stenosis with regurgitation in the rheumatic type of heart lesion. In the discussion which followed it was noted that in Cabot's recent publication *Facts about the Heart*, was a chapter headed "That rare disease mitral regurgitation." Dr. Young referred to some lesions, particularly the athero-sclerotic types which may produce a pure regurgitation.

Dr. Delamere presented two cases with interesting nerve lesions. One, a young girl had developed a spasmodic condition of the sixth and seventh nerves on one side of the head after an indefinite illness with some fever; there had been no lethargy and singularly little indisposition. It was found on later examination that there was in addition a well marked central scotoma of the eye on the same side. The multiplicity of the nerve lesions, involvement of the second, sixth and seventh nerves made a confusing picture from the neurological standpoint. A rapid improvement had taken place while under observation, and with a negative Wassermann reaction the question of syphilis seemed to be excluded from consideration. Dr. Kenneth MacKenzie referred to the frequent involvement of the eye muscles and to other isolated muscular weaknesses in multiple sclerosis; he said the rapid improvement with no treatment was quite consistent with the known courses of this disorder; it was difficult to speak positively however in such a case at such an early stage of the affection. Other speakers suggested the possibility of the preceding fever and indisposition pointing to epidemic encephalitis as the cause of the multiple, transient nerve irritations and involvements; reference was made to the acute forms of this disease now prevalent in parts of the province. Dr. Delamere regarded the course of the disease in this particular patient as contra-indicating the possibility of brain tumour or tuberculous meningitis. The second case, one of unilateral nasal hæmianopsia affecting the right upper nasal quadrant, was presented, the doctor said, with much hesitation, as there was but little he could say as to the origin of the condition. There had been the sudden development several months previously of a blindness limited to the upper portion of the nasal field on the right side. Examinations in the eye clinic had revealed no other abnormalities in vision or eye structures; the sinuses, the nose and throat showed no infections; the condition seemed stationary; no suggestions of syphilis or of other infectious disorders were in evidence; there was nothing abnormal in the condition of heart, arteries or kidneys; no blood disorder was present. In discussing this case Dr. MacKenzie remarked that it was easier to say what was not present than what was; a localized lesion of this sort was on the face of it not far back in the optic tract or there would be more involvement, even involvement on the other side; with diagrams he showed the results as regards the visual fields when tumours or hæmorrhages affect various parts of the brain. He suggested that the lesion in this case was a hæmorrhage in the retro-bulbar area, in front of the chiasma.

Dr. H. A. W. B. Brown presented a remarkable case of jaundice of sixteen years' standing. For all this time, he said, the patient, a man of thirty-three, was more or less yellow tinted. From time to time there would be marked deepening of the jaundice lasting for months. At these times there might be some vague gastric upsetting and indisposition, but as a rule the patient was not aware that anything was amiss, excepting the colour of his skin. He had not lost weight, and continued at his trade, there was nothing in the family history suggesting the existence of a familial jaundice. The stools were always bile stained, the urine

never high coloured. No disorder of the gastro-intestinal tract could be determined, no disease of the gall-bladder was revealed in the course of examinations. The spleen was not felt in previous examinations, but was now perhaps barely to be palpated. There was the history of one attack of pain in the gall-bladder region. Special examinations revealed only a slight secondary anæmia; the fragility of the red cells in hypotonic saline solutions was quite normal; there were no reticulated red cells. The serum of the blood was yellow tinted, even though the urine showed no excess of colour, and this, Dr. Brown thought was to be looked at as indicating a high renal threshold for the biliary colouring matters. Bilirubin was present in the serum but only urobilin was found in the urine. "The absence of bile-salts and bile pigments from the latter in the presence of outspoken jaundice suggests naturally the condition of acholuric jaundice. The presence of an indirect van den Bergh reaction in the serum spoke for a jaundice of non-obstructive origin." In the discussion which followed it was pointed out that there was nothing in the history of the case to suggest the possibility of the case being an example of the familial type of jaundice, and furthermore there was no splenomegaly, no increased fragility of the red cells, without which it was difficult to regard the conditions spoken of as suggesting either familial jaundice or acholuric jaundice. Professor Graham was of the opinion that the case would be better described as one of hæmolytic jaundice and added that he thought the spleen was at present to be felt; he referred to the jaundice seen at times in cases of pernicious anæmia in which the colour of the urine may not be increased; the absence of a family history of jaundice, of splenomegaly, of increased fragility of the red cells, and of reticulated red cells were vital points.

Dr. Gwyn showed a case of aneurism in a man whose chest was extremely deformed as a result of kyphosis and scoliosis. The man had come in complaining of angina like pain, and the first thought was that the heart might be labouring because of some distortion of its position in relation to the great vessels; he had been struck some years ago in Halifax at the meeting of the Canadian Medical Association with the serial sections from such a case shown by Dr. F. G. Finley. While investigating the position of the heart an aneurism with all the classic symptoms was found; the man's Wassermann reaction was strongly positive. In addition to the well marked "tracheal tug" the whole head was visibly pulled forward with each heart beat as if the trachea was actually pulling it down. There was no suggestion of excessive pulsation in the great vessels.

N. B. Gwyn

ARTHRITIS

Medical Society of Nova Scotia,—Halifax Branch

At the meeting of November 10th, a discussion on arthritis was opened by Doctors MacLarren and Lyons and participated in by many of the members present. Dr. MacLarren stated that arthritis is the oldest of recorded clinical conditions, reference being found to it in pre-Biblical literature, while evidences of its ravages are to be seen in the skeletons and tissues of mummies and in stone-age relics. After briefly outlining several classifications of the arthritides, Dr. MacLarren went on to discuss various factors in the causation. When congenital, neuropathic, static, traumatic and gouty types are excluded, he argued for common causal factors of which focal infection is the most constant and important, either alone or in association with biochemical or immunological changes. A combination of causes must usually be assumed, as instances are common in which focal infection alone is not provocative of arthritis. Studies of biochemical changes, endocrinic disturbances, etc., in arthritic individuals, have given encouraging results, but need to be continued and extended. It can, however, be assumed that if systemic sequelæ follow upon focal infection, a variety of factors will have been concerned in influencing the virulence of the organism on the one hand, and the immunity of the subject on the other. These factors, and factors determining incidence in certain tissues were discussed. It was pointed out that focal infection may cause damage in four ways: hæmatogenous infection, lymphogenous infection, systemic intoxication, or anaphylaxis. Dr. MacLarren urged that the casual association of focal infection with an arthritis can be determined only by following out a routine method which includes consideration of the history, the general clinical picture, the temperature record, the blood findings, diagnostic protein injections, bacteriological studies, and the investigation of the areas in which focal infection may exist—more particularly the teeth, tonsils, accessory sinuses and genito-urinary system. If a focal infection is disclosed, it is usually good practice to remove it, but recovery from an arthritic condition does not always follow such practice. Reasons for failures were discussed.

Dr. Lyons dealt with the treatment of arthritic conditions, emphasizing the importance of an earnest effort to understand the nature of the pathological condition before venturing upon severe manipulations. While in some cases considerable force may do no harm, in other cases showing similar deformity but dependent upon different pathological changes, only the gentlest manipulation is permissible. Susceptibilities of

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individual joints were rapidly reviewed seriatim, the special indications for treatment in each being specified. Cases were cited to illustrate the value of suitably selected correctional movements and splinting.

In the general discussion, Doctors Birt, MacLennan, K. A. MacKenzie, Murphy, Carney, Johnston, Burris, Schwartz, and others took part, so that internists, surgeons and specialists were represented. A conservative attitude was generally recommended, the consensus of opinion being that, ideally, a focal infection should be actually determined before operative procedures are adopted.

VICTOR O MADER

ARGYRIA—LEPROSY—LIGHT THERAPY

At a meeting of the Section of Dermatology of the Royal Society of Medicine held on October 21st several interesting cases of skin disease were shown. Among others Dr. H. Haldin Davis showed a case of argyria in a woman who had taken silver nitrate pills daily for a year twenty years ago, when she developed the staining of the skin which had persisted ever since. Argyria, the doctor said, was very capricious in its incidence; in another case it had developed after the use of protargol swabs for six weeks but this pigmentation disappeared in three years. Dr. E. Graham Little showed a case of nodular leprosy which he described as one of the most acute cases he had ever seen. It was treated by Dr. Hasson (*The Lancet*, 1926, i, 234.) with stock vaccine made from the blisters of previous patients. Fifty-three injections twice or thrice a week, mostly intravenously were given. In a fortnight æsthesia reappeared and after six weeks he was quite cured.

Prof. C. Rasch of Copenhagen then read a paper making some historical and clinical remarks on the effect of light on the skin and on skin disease. He began by condemning the attitude of those who regarded clinical medicine as a played-out science; modern medicine rested equally on two supporting pillars—clinical and experimental work. The first observations on the effect of sunlight on the skin were made by Everard Home in the Philosophical Transactions for 1821. Home had exposed the backs of his hands to the sun with a thermometer on each; one was uncovered, the other had a covering of black cloth. The former hand was scorched on each occasion, the latter was unaffected, but its thermometer registered a much higher temperature. He concluded that the black rete mucosum of the negro was a defence against the sun's rays. His experiments were confirmed later by Humphry Davy's brother John. Their experiments entitled them to the honour of the discovery that the power of the sun was due to light and not to heat.

Willan in 1798 had described an "eczema solare," and other sun-produced lesions were noted by Rayer (1835), Bazin (1860), Kaposi (1870), J. Hutchinson (1878), and Veiel (1887). In 1906 Dubreuil, of Bordeaux, had stated that most of the epitheliomata of the face and so-called senile alterations of the skin were produced by the light of the sun, and his conclusion had been foreshadowed by Robert Bowles in 1893, who had remarked that if the sun's rays would produce sunburn, erythema, and blistering they were clearly capable of producing deep and intractable ulceration of a low and chronic nature. More recently "permanent freckles" had been described by J. H. Sequeira (1911) and "war melanosis" by Riehl (1917). Between some of these conditions there were transition stages; Hutchinson's prurigo, for instance, could not be kept distinct from the polymorphic and eczema-like eruption described by the speaker. He believed, in fact, that all these eruptions should be included under the one term, "chronic polymorphic light dermatitis." Individual skins reacted to the itching caused by light with papular, urticarial, erythematous, or lichenoid lesions, and secondary infections might supervene, and on rare occasions small necroses might represent a transition to the hydroa vacciniformis of Bazin. These light eruptions might be hereditary and were very common among blondes—e.g., in Demnark out of 31,000 patients in five years no less than 230 had a light-lesion. It might be surmised that the itching was the pathogenic factor in the production of a rash.

The speaker believed that under the name of hydroa vacciniforme two diseases were being confused. One was the affection described by Bazin; the other was a special symptom-complex including prophyrinuria, large pemphigus-like blebs on the face, ears, and hands leading to gangrene, and atrophic processes in the fingers reminiscent of scleroderma or Raynaud's disease. This condition was first attributed to light by Prof. McCall Anderson in 1898. Porphyrinuria was not always associated with sensitiveness to light, and the administration of sulphonal and trional did not cause skin trouble. Possibly the real cause of all the symptoms was some unknown endocrine factor. The significance of porphyrinuria in light diseases and the relation of these conditions to epidermolysis bullosa hereditaria needed further investigation. Alcoholism also seemed to be a sensitiser for the development of light rashes.

In Denmark they had had two cases each of xeroderma pigmentosum, war melanosis, and colloid degeneration of the skin; pellagra was unknown. The chronic redness and thickness of the skin of the neck described by Jadassohn and Nikolsky was common, as were senile degeneration of elastic tissue and other so-called "senile" lesions.

It was an old experience that the rash of smallpox healed without scars if the patient were kept in the dark, and this treatment ought to be used in all cases. Pityriasis simplex was often irritated and was sometimes made eczematous by light. Acute eczema and many kinds of artificial dermatitis tended to become localized in the sites of chronic changes due to light. For instance, sulphur or fur dermatitis might be localized in the

sterno-clavicular triangle, although the exciting agent had spread over the whole chest. Rosacea was greatly aggravated by light; cases of this disease could profitably be divided into three groups: (1) rosacea cum acne, curable with sulphur; (2) rosacea cum pityriasi, curable with tar; and (3) rosacea cum acne et pityriasi, curable with sulphur plus tar (ichthyol). Lupus erythematodes might be caused by light and was decidedly aggravated by it; the lesion was often limited by clothing or ornaments. Tuberculosis and light were the most important internal and external causes respectively. The fresh eruptions disappeared rapidly if the patient were put to bed in the dark. Other skin diseases aggravated or caused by light were dermatitis herpetiformis, Besnier's prurigo, purpura, and erythema multiforme.

Few skin conditions benefited from light, and the value of the general light bath was usually due to its action on the organism as a whole. Acne vulgaris, secondary syphilitic infections, elephantiasis, and lichen planus might be benefited, and light prevented the development of a papular syphilitic lesion. Even in these cases, however, it seemed that pigmentation played a part and that the curative effect was not purely local.

It was a common mistake to think that as much light as possible was good for all people and all diseases.

ROYAL SOCIETY OF MEDICINE

The Prime Minister at the Annual Dinner*

The annual dinner of the Royal Society of Medicine took place at the Hotel Victoria on November 18th, when a company of 450 sat down at the tables under the Presidency of Sir James Berry, F.R.C.S. The society was honoured by the presence of the Prime Minister, the Right Hon. Stanley Baldwin.

The Prime Minister, in proposing the toast to the society, said that he had been impressed by the extraordinary way in which all medical knowledge and practice was embraced under the single title of the society. He had read with much interest the society's calendar, and he could not help thinking how proud Sir Andrew Clark would have been had he lived to see the day when the society took its present shape, for Sir Andrew had desired to bring together the profession, for their common help in all investigations in the various departments of medicine, and to provide a common centre for the collection, co-ordination, comparison, and criticism of their respective researches. Nearly twenty years ago seventeen separate medical societies went to sleep for a moment, and when they recovered consciousness found themselves thirteen separate sections of the Royal Society of Medicine. He compared the constitution of the society to that of the British Empire, with autonomous parts, bound together, not by a crown, but by a library, which he trusted was more interesting than that in the House of Commons.

Mr. Baldwin went on to discuss certain points of similarity between the medical profession and the profession of politics. Both professions owed a most profound debt to the Greeks. He had lately read a fascinating little book in which there was an article by Dr. Charles Singer, and it had been a revelation to him, interested as he had always been in Greek thought, to be told by a scientific man what a debt his own branch of science owed to that great and remarkable people. Dr. Singer stated that the teaching in the wards of a modern hospital was based on that of the Greeks, and that Greek medical literature was full of evidences of really fine scientific effort. To most the great Hippocrates had been only a name, but he was evidently a personality who stood to-day as he stood then for learning, humanity, gravity, and —a quality which the speaker held in the highest esteem—reticence; in these respects Hippocrates must ever remain the type of the most perfect physician. (Applause.)

Throughout his life (Mr. Baldwin continued) he had been singularly unfortunate in having seen so little of members of the medical profession. But a great deal of the doctor's work stood a close comparison with that of the politician. Both the medical man and the politician were physicians, though he preferred the medical man's patients to his own. He himself had been trying to prescribe for some time, with complete failure. The goal which they shared was a very simple one—to try to attain perfect health, involving a normal balance of the functions, a harmonious co-operation of all the organs, whether of the State or of the body. The State was an infinitely complex assembly of growing structures never at rest. The cells that composed it were always being born and always dying, but throughout the change there was a moving equilibrium of the whole. It was subject to considerable variations in temperature. Had a clinical thermometer been applied to the constitution in the early weeks of last May it would have registered a temperature of 105° or 106,° and though this had abated, there were symptoms of fever still in the body politic. A very virulent epidemic was abroad which might perhaps be diagnosed as Russian influenza. (Laughter.) It was not endemic, but epidemic, and yet epidemics lasted for a few seasons, though he believed they had a tendency to become less severe. A Harvey was wanted in the political world to find out the mysteries of the cyclical ebb and flow of unemployment. He did not think that surgery was needed, though there were people in politics who were always willing to resort to the knife, and remove the House of Lords like an appendix. At the other extreme there were quacks and charlatans who sought to heal the sick by magic formulas, which they called slogans, exactly as the Romans used to try to set fractures by reciting meaningless phrases over the broken bones. One other thing he would say, with bated breath, that physicians, like politicians, sometimes had trouble with those members of their honourable profession who would not, or constitutionally could not, keep out of the press! This was a malady that broke out in the most unsuspected quarters. The profession of medicine had one advantage over that of politics. The medical men received emoluments appropriate to the confidence reposed in him by the public, but the politician did not. If any politician did, his salary would vary remarkably with events and seasons.

"One other personal confession I should like to make," said the Prime Minister in conclusion. "I have sought some medical assistance in the course of the year, and I should like to give you my own experience. I expect you all know your Samuel Butler pretty well, and you may remember the physician in *The Way of All Flesh*, who prescribed for Mr. Pontifex—whose symptoms somewhat resembled mine, he was feeling tired—a course of the larger

* *Brit. M. J.*, November 27, 1926, 1011.

mammals at the Zoological Gardens. This physician, 'one of the most eminent doctors in London,' said:

"'I have found the Zoological Gardens of service to many of my patients. I should prescribe for Mr. Pontifex a course of the larger mammals. Don't let him think that he is taking them medicinally, but let him go to their house twice a week for a fortnight, and stay with the hippopotamus, the rhinoceros, and the elephant, till they begin to bore him. I find these beasts do my patients more good than any others. The monkeys are not a wide enough cross; they do not stimulate sufficiently. The larger carnivora are unsympathetic. The reptiles are worse than useless, and the marsupials are not much better. Birds again, except parrots, are not very beneficial; he may look at them now and then, but with the elephants and the pig tribe generally he should mix just now as freely as possible.'

"During the long and weary months of the coal stoppage I more than once escaped into Regent's Park, and became aware of a feeling which I had not experienced during my conferences—in Mr. Pontifex's own words, I received an influx of new life, or derived new ways of looking at life, which is the same thing. I found the doctor quite right in his estimate of the larger mammals as those most beneficial. As for the elephants, especially the baby elephants, I seemed to be drinking in large draughts of their lives to the recreation and regeneration of my own. I mention this in the hope that one or other of my hearers may find the hint useful."

Mr. Baldwin then gave the toast, saying what profound respect he had for the medical profession—a profession in which more was freely given to the people of this country out of the largeness of its heart and out of its wisdom and experience than from any other profession in the world, and those who rose up and called it blessed were beyond all enumeration.

Sir StClair Thomson then invested the President with a gold chain of office which he presented to the society. It was, he said, some three hundred years old, of the Elizabethan period, and doubtless wrought by some Italian artist, some Benvenuto Cellini of the Renaissance. He had had the benefit of the expert advice of the South Kensington Museum and of his friends Sir Frank Dicksee and Sir George Frampton, who had agreed as to its period and its artistic value, and that it was worthy of being offered to the Royal Society of Medicine, and the Council had honoured him by accepting it.

Sir James Berry expressed thanks to the Prime Minister for the felicitous terms in which he had proposed the society's health, and to Sir StClair Thomson for the valuable gift of one of the most beautiful chains in London. The chain would serve to remind them of their immediate Past-President, whose generosity was equalled only by his brilliance and wit.

The only other toast was that of "The Guests," which was proposed by Dr. Robert Hutchison. In a happy reference to the Prime Minister Dr. Hutchison said that Mr. Baldwin might have been even more in his element as a country doctor than as a politician. He would not have made a good specialist—he was too honest for that!—but with his love of the country and of the country people and things, and his sympathy for the common man, he would have made an ideal country practitioner. He coupled with the toast the names of Sir William Bragg, Fullerian Professor, Royal Institution, and Sir Berkeley Moynihan, describing the latter as a sort of surgical "Pooh-Bah." Sir Berkeley, he said, must find it, as President of his famous college, somewhat of a bore to attend so many official dinners, but in his private capacity it must afford him a certain satisfaction to see laid broad and deep before his eyes the foundation of those dyspeptic disorders which brought so much grist to his mill. (Laughter.) In Yorkshire, a county whose people were supposed to be somewhat addicted to the pleasure of the table, they had two gifts of Providence—the waters of Harrogate and Sir Berkeley Moynihan. If the first failed, the best they could hope for any patient was that he might fall into the arms of the other.

The last event of the evening was the presentation of the Gold Medal of the society to Dr. J. S. Haldane, F.R.S.

BIOLOGICAL STANDARDIZATION OF REMEDIES*

The Royal Society of Medicine, Section of Therapeutics and Pharmacology

At a meeting of this section held on November 9th, with Dr. George Graham, the President, in the chair, Dr. H. H. Dale opened a discussion on the Biological Standardization of Remedies. He said that every remedy with a potent and definite action should be supplied for therapeutic use with its activity indicated in some clear and intelligible notation. Where the active constituent was determinable by chemical methods this was simple, but there was a large and growing class of important remedies to which chemical standards were not applicable. In many of them the activity could be measured by a biological method. Everybody agreed on the importance of biologic units for measuring diphtheria antitoxin, insulin, and pituitary extract, but there had been a tendency to doubt the need for and value of such testing in the case of drugs which had long been used empirically. To the experimental worker the inevitable variation of the reaction of different patients, so far from making accurate measurement of a drug's activity less important, made it the more urgently necessary. His second principle was that the word "standardization" had no proper use except in relation to some generally accepted standard. This seemed obvious and yet no official standards of activity, biologically determined, had hitherto been available in this country. They were, however, to come into force next year. Under these circumstances the manufacturers could not be blamed because preparations of widely different activities had been issued by different firms, but the natural result had been to strengthen conservative scepticism and bring the principle of biological standardization into unjustifiable disrepute. The League of Nations had interested itself in the promotion of international uniformity, and already standards had been agreed upon for two sera, for insulin, for pituitary extract, and for salvarsan.

Dr. Dale urged the necessity for *making the basis of all biological standards comparative.* As a matter of practical experience it was not possible to define a unit for the activity of a remedy in absolute terms of some animal reaction. Ehrlich established the unit for diphtheria antitoxin in terms of a definite weight of an arbitrarily-chosen standard, and this method had stood the test of time. The first suggestion of measuring potent and variable drugs like digitalis by analogous methods had come from the late Prof. Cushny. Pharmacologists, however, for many years fell into error and ran a serious risk of discrediting their methods by tending to attribute too absolute a value to the determination of a limiting value such as a lethal dose. The drugs with which they dealt were different from the diphtheria antitoxin, where the aim of the test was to find the quantity of serum which left one lethal dose of toxin free and effective, so that an error even of 100 per cent in the measure-

* *The Lancet*, Nov. 13, 1926, 1039.

ment of the free toxin involved comparatively little error in the determination of the neutralizing quantity. Moreover, the animal used was merely the indicator in a titration, *whereas for a "lethal dose" test the sensitiveness of the animal was a most important factor*, and the measurement could not be accurately made on a small number of animals. The International Conference in Edinburgh in 1923 had decided to test the different methods recommended for standardizing digitalis. The tests from many different countries showed complete agreement so long as the results were evaluated in comparison with a standard, but when an attempt was made to define the activity of any of the given specimens in absolute units of animal reaction the widest discrepancies appeared.

In the early days of insulin attempts had been made to define a unit as the quantity needed to produce hypoglycæmic convulsions in a rabbit weighing 2 kg., but it soon became clear that this quantity varied enormously with different rabbits. Other laboratories tried to fix it by determining the dose needed to produce convulsions in a given proportion of mice, but found that small changes in diet and environment made large systematic differences in the reaction. Fortunately, the Edinburgh Conference had been able to intervene and fix a standard dry preparation.

The proper notation for the expression of the activity of a substance was one which employed an arbitrary but uniform and generally accepted unit of activity. Nobody would think of prescribing diphtheria antitoxin or insulin in drachms or cubic centimetres, but unfortunately dosage by volume of pituitary extract had grown up. There was no longer any excuse for the marketing of extracts varying, even theoretically, from 5 per cent to 20 per cent of the gland substance; a standard was now available.

All the International Conferences had accepted the principle that a *standard should consist of a specimen of the therapeutic substance itself*, or *of its essential active constituents*, in a stable form. This was the only safe principle. The attempt to introduce such substances as histamine and potassium chloride as standards for pituitary extract had failed completely. The proper standard for digitalis was digitalis and a standard international sample of this drug had recently been completed by Prof. Magnus, of Utrecht.

It might seem strange to insist that the methods of biological comparison should be such as to give reasonably accurate measurement of the therapeutic activity, yet experience had shown that it was necessary to lay this down. The expression "biological standardization" had been used for methods which could not be applied quantitatively to the measurement of anything, and without any evidence that the crude qualitative indications they gave had any relation to the therapeutic effect. The difficulty was to make clinical measurements of activity with any degree of precision, but it was not an insurmountable one, and there was room for much careful work.

It had been found that guarantee of freedom from undue toxicity was insufficient for neosalvarsan preparations as it was easy to produce products with a toxicity far below the official maximum, but with a therapeutic potency also lowered. A test for potency had, therefore, to be elaborated and the speaker and his co-workers had found that an estimation of the curative activity on mice infected with trypanosomiasis corresponded accurately with the estimation of efficacy in causing the disappearance of the spirochæte from superficial syphilitic lesions in man. Similar correspondence between laboratory and clinical tests had been found with digitalis and insulin. Laboratory workers must bear in mind the need for correlating their investigations with clinical work.

Dr. J. W. Trevan dealt with the accuracy of certain well-established tests devised for all sorts of remedies which could not be standardized by chemical methods. Tests for insulin, digitalis, ergot, adrenalin, vitamins, and the ovarian hormone had reached such a stage that a definite value could be attributed to the degree of their accuracy. On the other hand, the methods described for testing parathyroid, thyroid, cannabis indica, and other substances were not supported by sufficient evidence for quantitative work. The errors which had to be considered were very largely due to the variability of the animals or organs used for the tests. He showed a chart illustrating, in a series of 250 frogs, the way in which they differed in the quantity of strophanthus required to stop the heart in systole in twelve hours. It took at least three times as much to kill some frogs as others. A similar chart showed the percentage of convulsions produced by different doses of insulin; here the variation was even greater. The same difficulty arose with isolated organs.

The best and most accurate way of avoiding this difficulty was to use some reaction which was quickly reversible, so that the effect of the drug to be tested could be produced, washed out again, and repeated with a sample of some standard preparation. For instance, the rise of blood pressure in a cat bore a simple and constant relation to the dose of adrenalin injected, and the expected error could be worked out from the curve. In the middle of the curve it was found, both theoretically and practically, to be of the order of 6 per cent. The same sort of curve was obtained with pituitary extract, but here the sensitivity of the uterus did not remain constant throughout the experiment, so that the error was between 10 per cent and 20 per cent of the dose given. The method was also applicable to the artificial œstrus produced in castrated female rats by ovarian hormone, but the difficulty here was that a large increase in dose was necessary to produce a distinguishable increase in the œstrus. Recently it had been found that digitalis could also be tested in this way by its action on the rabbit's auricle in Ringer solution of a hydrogen-ion concentration of 7.4 obtained with boric acid mixture. An excessive dose produced a toxic effect which greatly increased the difficulty of washing out. Not all drugs, however, could be tested by a reversible reaction, and for some of these Clark's method for ergot was useful. Here two strips of uterine muscle were removed, as close together as possible, and tested in separate baths at the same time. A third way was to increase the number of tests, as, for instance, had been done with the action of digitalis on frogs and cats and of insulin on mice, and to some extent on rabbits. In the speaker's opinion the term "minimal lethal dose" had no fixed meaning and should be dropped in favour of the "average convulsive—or lethal—dose"—*i.e.*, that obtained at about the middle of the range. Unfortunately, this varied from time to time, and might be twice as much on one day as on another, as animals showed periodic variations in sensitivity. Therefore, until a worker had demonstrated satisfactorily, through a very large series of experiments, that any given lethal dose method did not suffer from this "shift" in the average lethal dose, he must always assume that it might do so, and whenever he tested an unknown substance he must at the same time inject an equal number of animals with a standard preparation for comparison. This meant many experiments and many animals. It had appeared that certain antimonial preparations did not suffer from "shift," and possibly salvarsan was also free. The method of determining the error in a lethal dose experiment was complicated, but the expected and calculated errors had been found to correspond very

well. If there were a 10 per cent error it meant that 800 mice had to be injected, or, if digitalis were being tested on frogs, a 20 per cent error meant the use of eighty animals.

Another method, which avoided this difficulty, was Hatcher's cat method for digitalis, wherein the drug was injected into a vein until the heart just stopped, and the dose was then calculated. The method of estimating the blood-sugar of a rabbit when testing insulin had the advantage that the rabbit could be used again a week later, but the sensitivity of rabbits varied from week to week. The number of animals necessary for the different tests in order to get an error of less than 25 per cent was as follows: Adrenalin test, 1; pituitary test, 1; Clark's method for ergot, 1; auricle method for digitalis, 1; Hatcher method, 5; left ventricle of frog, 10; lymph sac of frog, 80; insulin in rabbits, 6; insulin in mice, 200. Eighty frogs or 200 mice proved, however, only slightly more expensive than the smaller number of cats or rabbits, as the latter required careful watching all the time by skilled assistants.

Correspondence

Our London Letter

(From our correspondent)

Epidemic of Infantile Paralysis.—It has been feared for some years that an epidemic of infantile paralysis or anterior poliomyelitis might occur in this country for the terrible outbreak in the City and State of New York in 1916 has, so to speak, been hanging over our heads. In August of this year a certain number of notifications of the disease in excess of the expected seasonal increase occurred, but it was not until the middle of October that a definite outbreak was reported from Broadstairs, an east-coast sea-side resort with many schools and children's convalescent homes in the vicinity. The latest returns indicate that the Broadstairs outbreak has been successfully combated, but cases have occurred in other parts of the country, at Leicester, in the Midlands, for example, and, what is perhaps more serious, also at Uppingham School, a large public school where one case was fatal. The method adopted by the school medical authorities in the two places have led to much comment. At Broadstairs, Lord Dawson and Dr. James Collier recommended that the children be kept at school, each school or convalescent home being rigidly isolated as a separate community. Work and play proceeded as usual, gargling of the throat was carried out by each child three times a day and careful supervision led to the detection of cases at the earliest stages of the disease. One child who was removed by its parents from Broadstairs was responsible for infecting another child in a different part of the country, and this is significant in view of the fact that the authorities at Uppingham decided to close the school for a fortnight and send about 500 boys to their homes. The possibilities of spread by contact cases appears a very serious danger in such a procedure, but it is only fair to point out that there are thirteen boarding houses at Uppingham School, some of them opening on the main street of the town so that imitation of the Broadstairs plan of isolation was impossible. At the time of writing no serious outbreak has occurred in London, and there is every reason to suppose that the epidemic is abating.

The Doctor's Dilemma.—It was perhaps after a careful examination of the pulse of the general public that an enterprising theatrical manager has seen fit to revive Bernard Shaw's play a week or so ago in London. For the great controversy aroused some months past over the General Medical Council and unqualified practitioners has now shifted round to the subject of doctors who write for the Press, and, as Dr. Leonard Williams expressed it at one of the many discussions held on the subject in the last few weeks, "the public no less than the profession has got into a stage of militant hysteria." It is very curious that newspapers in this country having always rather prided themselves on the unsigned editorial, maintaining that they vouched by their very reputation for the authenticity and reliability of the information therein described and discussed, should demand articles on health matters signed by medical authorities, for it obviously looks as if there were something in a name after all, and perhaps the expressed desire to promote the health and well-being of the public is not undertaken without an eye on the net sales. There is at the present time in journalism a great vogue for signed articles, and it is notorious that famous pugilists and what-nots, who can scarcely sign their own names, are announced as the authors of articles obviously written for them. It is admitted by the journalists who demand fair play for the profession, that medical men usually write the articles they sign, but it is typical of the attitude of the press to the medical profession in general that a certain new society for the promotion of health in this country is commended in a leading article of a prominent daily paper because "the society ranks among its members three ex-Prime Ministers," a phrase which might occur equally as well in a company prospectus or an advertisement for soap. The whole question of course hinges round that blessed word "advertisement:" if signed articles bring patients to the author's consulting room then it is obviously a practice which is not in the best interests of the public. It is fairly safe to say that most of the articles recently given wide publicity as appearing in defiance of some supposed ban can only be ranked

as bad advertisements for their authors. There is, however, no ban on any doctor writing a health article and signing it: he is simply warned that if he does he must walk warily and not introduce controversial matters. Perhaps presently someone will be found whose style is not cramped by such a simple restriction.

ALAN MONCRIEFF

London, December, 1926.

THE LISTER MEMORIAL COMMITTEE HAS APPROVED THE FOLLOWING LETTER TO MEDICAL SCHOOLS AND HOSPITALS

Next year, 1927, will be the centenary of Lord Lister's birth. He was born on April 5, 1827. There is no doubt that many surgeons, and scientific men throughout the world will observe this centenary. In Britain, the British Medical Association will meet in Edinburgh and a celebration of Lister's centenary is to form a leading part of the programme. In Canada, the second Listerian Oration is to be delivered in Toronto before the Canadian Medical Association.

But, it would seem desirable that steps should be taken to observe, in every year, the natal day of Lister—to whom the world owes so much, who was, to quote the recent words of Moynihan, "the greatest material benefactor the human race had ever known." Already steps are being taken toward this end. In Glasgow, where the antiseptic system had its beginning, Sir Hector Cameron, Lister's oldest living house surgeon, will deliver an oration on April 5th. At King's College Hospital, London, Sir Watson Cheyne will address the Lister Society. At the Johns Hopkins Hospital arrangements have been made to celebrate the day.

It is with these facts in mind that the Lister Memorial Committee of the Canadian Medical Association address you. The Committee ask for your help in the establishment of the fifth of April as "Lister Day" in every medical school and every hospital and every health centre throughout the world.

The Committee suggest that in every medical school, on that day, some special notice should be taken of Lister's work, which, indeed, touches every branch of medicine. That in all hospitals the wards may be decorated in some suitable way, and perhaps a lecture on Lister be given to such patients as are convalescent. Further, that the medical profession everywhere should try to arrange for co-operation with the public health authorities to select Lister Day as a date for special appeals in aid of hospitals, and of all measures to interest the public in such questions as the anti-tuberculosis movement, the cancer campaign, and sanitation in general. It is also suggested that in many places, in town and country, medical men will assist the educational authorities in observing Lister Day in some appropriate way in the schools.

We shall be glad to know if these aims have your approval.

For the Lister Memorial Committee,

JOHN STEWART, *Chairman,*

F. N. G. STARR, *Secretary.*

112 College Street, Toronto.

Association Notes

SOME FACTS ABOUT THE CANADIAN MEDICAL ASSOCIATION

The Canadian Medical Association was founded in 1867, dating back to the year of Confederation. The organization signalized an attempt to develop a national *esprit de corps* among the medical men of the Dominion of Canada.

Since its inception, the Association has failed on two occasions only to hold annual meetings. These meetings have been moved from East to West and from West to East throughout the past half-century, offering splendid opportunities to the profession in this very large country to become acquainted.

Sixteen years ago, the Association commenced publication of its own *Journal*. Before this venture had become firmly established the Great War was upon us. Then followed four lean years for the Canadian Medical Association, as the energies, efforts and interests of the profession were centred, naturally, upon the duty of the hour. Following the war and the return to practice of hundreds of our colleagues, the Association attempted to rehabilitate itself. The outlook was not too bright. During the war period, while the revenue was greatly diminished, printing and other costs continued to roll up a deficit. In 1921, we found ourselves at the cross roads, demanding a definite decision. We must either adopt an aggressive forward policy, or disband. At this time, we had a little over one thousand members paying an annual fee of $5.00. Our deficit was close upon $18,000. Our assets were practically nil.

At the Halifax meeting of that year, the Council decided that the Association would go forward; and the members present endorsed the sentiments by unanimously agreeing to double the annual fee and to raise, by bond subscription, a sufficient

sum of money to liquidate our indebtedness. The year 1921, will be recorded in history in so far as the Canadian Medical Association is concerned, as the mile stone which marked the road toward a steady upward climb. During the past five years, the membership has increased to a little over 3,000. A liability of $18,000 has been wiped out, leaving us a credit balance approximating $12,000. Our budget in 1921 did not exceed $20,000. Our budget in 1926 was just a little under $85,000.

Year by year, practitioners in increasing numbers are inquiring what the Canadian Medical Association stands for, and are asking what advantages it offers to the man in practice. Probably this can best be answered by outlining some of our activities:—

1.—The Journal

The *Canadian Medical Association Journal*, a monthly publication, is recognized to-day, not only in Canada, but in all of the English speaking world, as one of the finest medical periodicals extant.

The *Journal* endeavours to publish the best in medical work and thought emanating from the profession in Canada. Furthermore, it attempts to keep the profession in Canada in touch with all medical news of national interest.

The *Journal* alone is worth $10.00 per year, which is our annual membership fee. Because this splendid publication exists, the medical profession in Canada occupies in the minds of the medical world a higher position than would otherwise obtain. The *Journal* is the one great medium which stimulates better medicine in Canada, and, further, keeps the world in touch with what Canadian medicine is accomplishing.

2.—Education

Every broad-minded practitioner of medicine realizes the importance of a progressive policy of medical education. The doctor who allows his mental equipment to stand still, stagnates. Each decade sees so many contributions made to medical learning and achievement that it behooves the man in practice to keep constantly on the alert for new ideas, improved methods and approved helps. Realizing the importance of all these factors, the Canadian Medical Association has endeavoured to assist organized medicine throughout Canada in furthering post graduate plans. To local medical groups, district meetings and Provincial Associations, from coast to coast, the Canadian Medical Association has sent teachers of medicine. During the past year, the sum of $30,000 has been expended in this work, thanks to the munificence of one of our great financial institutions, the Sun Life Assurance Company of Canada. During the year, 169 teachers delivered 513 lectures to an aggregate attendance of 17,264.

Just here, it gives us great pleasure to announce that the Sun Life Assurance Company has given us a second $30,000 to carry on extra-mural work for another year.

Every Provincial Medical Association in Canada has expressed its great appreciation of our post-graduate efforts. Hundreds of practitioners have spoken in praise of this splendid type of service.

The Canadian Medical Association is the only nationally organized medical association in the world carrying out such an ambitious and extensive extra-mural post-graduate programme.

3.—Legislation

By establishing a clearing house of information on medical legislation, as it exists not only in the provinces of Canada, but in other parts of the world, the Canadian Medical Association offers a service to all of the provinces whenever medical legislation is threatened, or whenever an aggressive policy for improved medical legislation is desired. We have been able to assist more than one province in its legislative efforts.

4.—Organization

The central staff of the Canadian Medical Association is available to all of the provinces to assist in the organization of District and Local Medical Societies. This service has been used by several of the provinces to the advantage, it is believed, of organized medicine, both locally and nationally.

5.—Medical Service Bureau

During the past three years, our Placement Department has been utilized by more than 500 physicians. This service is open to every member of the Association who desires either to sell his practice, secure an assistant or locum tenens, or, on the other hand, to the young practitioner who is seeking a location. The Department is one of great practical value and is being increasingly used from year to year.

6.—Economics

In the field of Economics, the financial side of our professional life, the Association has been very active. Information has been gathered from and returned to the various provinces dealing with such matters as health insurance, lodge and contract practice, charity work, etc., etc., all of which we believe to be of interest and value to the practising physician. The Canadian Medical Association urged the Federal Income Tax authorities to increase the tax-free allowance per dependent child from $300 to $500. This amount was finally allowed.

7.—Government Recognition

When it was learned that the medical superintendents in certain government hospitals were likely to be replaced by lay superintendents, the Canadian Medical Association let its voice be heard at Ottawa. That is a matter of nearly

three years ago. These hospitals are still in charge of medical superintendents.

Several years ago, the Federal Government, through its Department of Vocational Training, was subsidizing returned soldiers who were taking courses in chiropraxy. The Canadian Medical Association vigorously protested and the policy was immediately discontinued.

8.—Inter-relations

Through a very active Inter-relations Committee, there has developed, during the past three years, a very much improved spirit of co-operation, not only between the profession in the various provinces but in our contact as a profession with the general public of Canada. To such an extent has this developed that we may say Canadian Clubs, Service Clubs, Boards of Trade, Chambers of Commerce, Government Boards, and in fact all other organized branches of society, to-day recognize the Canadian Medical Association as the spokesman of organized medicine in Canada. This permits not only of real public service, but also provides the medical profession in Canada with a very forceful and virile organization which, obviously, offers advantages.

9.—Workmen's Compensation

Many of the provinces in Canada have Workmen's Compensation Legislation which provides compensation for the accidents incident to industry. It has been found necessary to approach these various Boards to bring about a closer co-operation between them, particularly in reference to the overlapping of provincial activities at their boundaries.

10.—Pharmacy

The physician naturally hopes and expects that the drugs which he uses in his practice are as pure and as potent as it is possible to make them. Unfortunately, the physician in the great majority of instances, is not in a position to judge whether or not a drug is what it purports to be. Realizing the national importance of this problem, the Canadian Medical Association advised the Federal Department of Health that standardization of drugs, both chemical and physiological, should be a duty of the Government. We are glad to say that the Government frankly admitted the validity of our contentions, and have, for the past two years, been working upon the establishment of a department whose duty it shall be to make sure that all the drugs being utilized in Canada are what they should be. This is real practical service both to the medical profession and the public.

It is further very interesting to note that, thanks to the representations of the Canadian Medical Association, an invitation has been extended to Canada to appoint a representative on the British Committee charged with the responsibility of revising the British *Pharmacopœia*.

11.—Medical Ethics

It sometimes happens that a member of the Canadian Medical Association may be accused of unethical conduct. The Association has machinery available to investigate such charges. If the charge is proven, censure is voted. If it is disproved, the physician so charged is honourably vindicated.

Although we enthuse over this Department in the inverse ratio to the amount of work it may have to do, yet we recognize it as a protection both to our members and to the public.

12.—Imperial Relations

The Canadian Medical Association became affiliated with the British Medical Association in 1924. In 1926, we were distinctly honoured in having His Royal Highness, the Prince of Wales, graciously consent to act as our Honorary Patron.

Members of the Canadian Medical Association receive the *British Medical Association Journal* at a special rate. Any of our members who go to the British Isles and present credentials from the Canadian Medical Association, are most heartily welcomed by the officials of the British Medical Association. Those who have taken advantage of letters of introduction have reported upon their return home, on the great kindness accorded them in England, and the splendid manner in which they were put in touch with the work they desired to see or do.

In further reference to our imperial relations, two Committees, one in Britain and one in Canada, have been working for some time upon a plan which would facilitate the conditions by which Canadians desiring to take advanced British degrees might do so. Both Committees report progress.

In 1930, the British Medical Association will hold its annual meeting in Winnipeg, this being the third time the British Medical Association has met outside of the British Isles, and, on all three occasions, in Canada.

13.—Annual Meeting

The annual meeting grows in interest from year to year. Not so long ago, the problem seemed to be: "Where shall we meet next year?" Now, the demand for the meeting is so great that the problem of Council is: "Which invitation shall we accept?" Obviously, we cannot hope in any one year, to bring all of our members together, realizing that they cover an area 4,000 miles in diameter. However, in increasing numbers, the distant men are turning up and Canadian physicians are becoming better acquainted, and, year by year, more national in spirit. Further, Council, which represents all Canada, meets for two or three days at every annual meeting, and endeavours in a most deliberative and careful manner to discuss and solve many problems of mutual interest to the profession.

During the week of June 13, 1927, the fifty-

eighth annual meeting will be held in Toronto. The Committee in charge commenced weekly meetings early in the autumn of 1926, and plans for a splendid convention are already well under way.

14.—SUMMARY

Membership in the Canadian Medical Association costs $10.00 per year. For less than three cents a day, the Canadian Medical Association offers to the practising physician not only the best in medical journalism, but an insurance policy to protect his honour, his place in the community, his professional status, and his national pride in his profession. The Canadian Medical Association is founded upon premises so strong, so worthy, and so helpful that it will go forward ever holding aloft the highest ideals and traditions which the followers of Æsculapius could desire.

REPORT OF THE COMMITTEE ON PERSONAL ARCHIVES

In the past, little has been done towards the development of the archives of the Association. At the meeting held in Victoria, B.C., in 1926, it was decided to appoint a Central Committee of six members whose aim would be to obtain from each individual member, a short concise history of his medical career. Two additional members in each province were to be added to the Central Committee at a later date.

The Central Committee has held meetings at Montreal and has drawn up a *questionnaire* which will be forwarded to each member, and it is hoped that a prompt response will be met with. It is also hoped that members will forward information about any outstanding man (old practitioner) who may not be a member of the Association.

BEWARE

of foreign collection agencies and Insurance Companies not licensed to do business in Canada. Do not do business with either unless you are perfectly certain that their methods are satisfactory and that you are fully protected in dealing with them. This warning is issued because of numerous complaints which have been brought to our attention.

T. C. ROUTLEY,
General Secretary.

Two Factors in Catarrhal Deafness.—Hypertrophy of the lower turbinate has long been known to be a most potent factor in catarrhal deafness (obstruction of the eustachian tube). Otologists have for many years amputated the posterior hypertrophy by means of a cold snare and this has frequently been a satisfactory procedure, but there are other cases in which the result may be obtained even after cold snaring has failed. The procedure employed by Greenfield Sluder, St. Louis, for this purpose consists in the destruction of the soft tissues of the posterior tip of the turbinate by means of the galvanocautery. One incision is made under the tip, another is made on top of the tip, and a third incision is made on the middle of the tip and is prolonged backward until it reaches the face of the eustachian tube. Then, from in front, the middle incision is prolonged forward as far as the judgment of the surgeon may indicate. The healing of this wound fixes the scar on the bony tip of the turbinate, and as it contracts in its maturity it draws the anterior lip of the tube forward more or less to open it. The operation is difficult as it must necessarily be done through the mouth, the field being visible only in the postnasal mirror; but when properly performed it has proved to be no more dangerous than any other postnasal surgery. A most important factor is that the nose once operated on should be left absolutely alone. No nasal washes or applications should be made to the wound. The anterior nostril should be closed by a cotton pack which should be left in place for a week. The second factor in catarrhal deafness is the sphenoid cell. Opening the sphenoid according to the procedure described by Proetz is advocated by Sluder.—*J. Am. M. Ass.*, Nov. 20, 1926.

Abstracts from Current Literature

MEDICINE

Nasal Sinusitis as a Cause of Toxæmia. Willcox, Sir. Wm., *J. Laryngol. & Otol.*, Nov., 1926, xli, 709.

Toxæmia is generally recognized as the most important etiological factor in the causation of systemic disease. In by far the greater number of diseases the specific causal organism is not clearly demonstrable. In most of these cases a careful search will reveal some definite toxic factor—a focus of bacterial infection. Dental sepsis comes under this heading and it is recognized that even in the absence of local symptoms radiological examination may reveal a focus of infection at the base of a tooth. In the present paper the author wishes to point out how often the nasal sinuses are the seat of a focus of infection, and as in the case of the teeth, the disease may be latent and only revealed after a very thorough search. A clear serous effusion, or œdematous mucous membrane which would not obstruct the rays of light from the transilluminator might show some opacity to the x-rays. However, the most positive diagnostic aid is the puncturing and washing out of the suspected sinuses. The bacteriological study from the washings of a series of cases has shown that where there are systemic manifestations the *S. viridans* has most often been found.

There are many cases reported to show the association between disease in the nasal sinuses and some general systemic condition. In most of these cases relief of the general condition followed treatment of the sinusitis. It is pointed out that owing to the danger of auto-intoxication a focus should not be treated surgically during an acute exacerbation. If the focus is latent and multiple, as in the cases of both teeth and tonsils, only one thing should be dealt with at a time to allow any auto-intoxication which might arise to subside between each operation.

W. J. McNALLY

Changes in the Chemical and Physical Characteristics of the Blood Following the Administration of Parathyroid Hormone. Cantarow, A., Caven, W. R., and Burgess, Gordon, *Arch. Int. Med.*, Oct., 1926.

The writers review the strictly chemical idea of the existing relationship of calcium, phosphoric acid and carbon dioxide in the blood and plasma as outlined by various workers. They then go on to state that in addition to these known factors, it was generally believed that there existed some unknown agent of fundamental importance in calcium metabolism, probably related in some way to the secretion of the parathyroid glands. Following Collip's work it was found that the administration of the parathyroid extract or hormone caused an increase in the concentration of calcium and phosphates in the blood without any of the complex compensatory chemical changes which had been considered necessary by previous workers.

It would seem that the functions of the parathyroid are, first, the retardation of the precipitation of calcium from the blood and, second, the abstraction of calcium from bones and probably other calcific deposits. The authors were particularly interested in noting the effect of the administration of the parathyroid hormone on the clotting time of the blood.

The technique consisted in giving 15 units of parathyroid extract subcutaneously, followed eight hours later by another 10 units. The examination of the blood was then made twelve hours later. In the first group studied three points were outstanding:

1. A definite decrease in coagulation time was observed in every case, but no significant change in carbon dioxide combining power or in the plasma chlorides.

2. There seemed to be a general tendency toward increased concentration of the blood as suggested by the rise in the red and white cell counts, hæmoglobin and blood viscosity.

3. It was apparent that the concentration of calcium in the serum had no constant relation to the rate of coagulability.

In the second group studied, determinations were made of whole blood calcium, serum calcium and coagulation time at three-hour intervals following the injection of 15 units subcutaneously. As a result of these observations it seemed as if the period of most rapid coagulation occurred between ten and fifteen hours after the injection of parathyroid hormone. At this time the whole blood calcium was elevated to its highest point. It would appear therefore that the clotting time bore a more definite relationship to the calcium level of the whole blood than to that of the serum, since it was noted that the greatest elevation of serum calcium occurred between two and five hours after the injection of extract.

L. C. MONTGOMERY

The Contagion of Tuberculosis. Opie, E. L., and McPhedran, F. M., *Am. Rev. Tuberc.*, Oct., 1926, xiv, No. 4.

This paper embodies the results of an extended study of latent tuberculosis. It is pointed out that the contagiousness of phthisis is a subject still presenting some obscurities, more especially

with regard to its spread, and this particular investigation is concerned with the problem of latent tuberculosis in children, its recognition and the part it plays in spreading tuberculosis generally. The diagnosis of latent tuberculosis may call for quantitative intracutaneous tuberculin tests and specially adapted x-ray methods. The authors hold that latent phthisis can be clearly divided into infantile and adult types. The infantile form begins as a focus in any part of the lung, and is associated with caseous lesions of the lymph nodes which are nearest in the direction of the lymph flow. The adult type begins in the apex of the lung and has no accompanying tuberculous lesions of adjacent lymph nodes; it has the characters of a second infection.

They conclude that when latent tuberculosis is taken into consideration, tuberculosis presents the characteristics of a contagious disease and affects all children of households within which there is someone with the disease. Their evidence goes to show that the infection may be transmitted both to adults and adolescent children, and it is believed that about one-half of the partners of marriages where open tuberculosis is found, are infected after the marriage.

The length of the period of exposure to open tuberculosis is an important factor in determining the character and severity of the resulting infection. Apparently, the development of tuberculosis of the tracheobronchial lymph nodes takes place sooner than that of latent apical tuberculosis. In the former case, the average duration of contact with the disease was four and a half years, and in the latter nearly twice as much.

Special attention should be given in dispensaries to the matter of the spread of latent infection within families. There is no doubt that latent infection often becomes manifest, and as soon as the dormant condition is recognized the individual should be treated with the same care as if he were a case of arrested tuberculosis.

H. E. MacDermot

SURGERY

The Relation of the Cæcum and Ascending Colon Content to Idiopathic Epilepsy. Armstrong, G. E., *Practitioner*, 1926, cxvii, 288.

The view that ordinary idiopathic epilepsy is a disease of the brain has been challenged. Oppenheim states that he believes epilepsy to be a "toxico-pathic condition" with cerebral manifestations; James Collier in a paper which opened the Neurological and Psychological Sections at the annual meeting British Medical Association in 1924 set forth his reasons for regarding epilepsy as a metabolic dyscrasia.

The history of the two following cases are presented by Dr. Armstrong as indicative of some relationship between certain toxicopathic conditions, apparently arising from the absorption of toxic substances from the cæcum or ascending colon, and the development of epilepsy in two patients of his.

The first was a male aged forty-four years, single, who had suffered from attacks of *petit mal* over twenty-five years. In 1913 he suffered from much gastric distress occurring with regularity about two hours after food; symptoms which were diagnosed as due to duodenal ulcer. Gastro-enterostomy was performed, and the patient remained well and free from any of his fits for about a year. After that respite however, the fits and epigastric pain recurred. Gradually the fits became more and more severe, so much so that he became afraid to go into society and finally would only go out of doors after dark in the company of a friend, lest he should fall. In other respects he appeared to be in fairly good health. His heart, lungs, and genito-urinary system showed no sign of disease. An x-ray examination demonstrated a certain amount of enteroptosis, and colonic stasis. His blood pressure was systolic 145, diastolic 90. During the three months prior to his admission to the hospital there had been complete loss of consciousness on three occasions.

The improvement in his general nutrition, and the absence of fits for nearly a year which followed the gastro-enterostomy suggested that his fits might be due to a toxæmia arising possibly from some defective metabolism in the colon, especially as his teeth, tonsils and sinuses had been found quite healthy. An operation was suggested to which he eagerly consented. The lower end of the ileum, the cæcum and the ascending colon were removed, and an end-to-end anastomosis between the end of the ileum and the transverse colon was made. He had no more fits and he is to-day an active business man with normal digestion. He has recovered his self-confidence and feels in perfect health.

The second case is more recent. A girl eleven years old had had peculiar attacks resembling those of *petit mal* for four years. There were no aura. She suddenly stopped what she had been doing, her body stiffened and her eyes rolled; occasionally there had been incontinence of urine. During the last two years the attacks had recurred regularly, and it was found necessary to remove her from school. The mother stated that the girl was becoming dull, and showed some mental deterioration. Under starvation diet for four or five days the attacks stopped. The x-ray picture showed general ptosis and colonic stasis. Medical treatment had no influence in changing the frequency or character of the fits. An operation was suggested and carried out similar in character to the previous one. The end of the ileum was joined to the end of the transverse colon. The fits ceased ten days after the operation and there has been no recurrence. The child has gained forty pounds

in weight and is going to school. At her last examination she was head of her class in mathematics.

The improved nutrition and the cessation of fits followed removal of that part of the gut which is chiefly concerned with absorption, and supports the idea of a toxico-pathic condition. These cases suggest a field of research that is full of promise. While major abdominal operations are not to be lightly undertaken it would appear that in some cases of idiopathic epilepsy in which other measures of relief have failed they may be legitimately recommended.

The Skin Triangle of Appendicitis. Livingston, E. M., *Arch. of Surg.*, Nov., 1926.

The significance of cutaneous tenderness in the diagnosis of acute appendicitis is no new thing, but Dr. Livingston believes that sufficient evidence has now been gathered to warrant the conclusion that it is the most important single sign or symptom of acute appendicitis. The paper opens with a review of the observations on cutaneous hyperæsthesia in appendicitis, the general conclusion apparently having been summed up in Sherren's statement "Cutaneous hyperæsthesia may occasionally be of aid in the diagnosis of appendicitis." Dr. Livingston has investigated the matter by methods different from those hitherto employed, and reports his conclusions in a series of 428 cases, over a period of six and a half years.

He lays great emphasis on the method of eliciting the skin sign; in his opinion the failure of previous observers to obtain positive results was due to the examination not being vigorous enough. He employs the traction method, the skin of the abdomen being picked up between the thumb and forefinger and pulled on until discomfort is produced. This is done first in some non-sensitive area and the degree of pull required to produce discomfort at that point is used as a standard of comparison by which hyperæsthesia may be detected when the pull is applied to other parts of the abdomen. It is claimed that the response within the involved zone is unmistakeably more painful than elsewhere, and hyperæsthetic areas are easily picked out by it. The area of the abdominal wall which becomes sensitive in acute appendicitis has been found to consist of a triangle with the following boundaries: a line from the umbilicus to the highest point on the iliac crest; a line from this point to the right pubic spine, and a line from this to the umbilicus. This area coincides with no one nerve distribution, and whilst it may not be the complete amount of surface involved in appendicitis Dr. Livingston holds that no other intra-abdominal condition gives rise to hyperæsthesia within its limits, and, a point on which much stress is laid, of an intensity which is greatest at its centre.

The sign may not be pathognomonic of acute appendicitis, as it may be found in appendiceal colic or herpes, or secondary involvement of the organ. But other findings must be taken into consideration in such cases, such as the absence of fever, low leucocyte count, etc. This, however, does not alter the value of the sign.

The paper should be consulted for detailed analysis of the series. In brief, it was found to be unmistakeably present in 86 per cent of over 400 patients. It is to be noted that these results are reported by a large number of investigators who have used it as a routine procedure at the Bellevue Hospital, New York.

H. E. MacDermot

Strictures of the Common Bile Duct. Judd, E. Starr, *Ann. Surg.*, Sept., 1926.

Secondary biliary tract operations are most difficult, not only technically, but from the presence of cirrhosis and cholangitis. Jaundice is present, either constant or intermittent. There are three groups of cases: (1) Those due to obliterative cholangitis. (2) Operative trauma with complete biliary fistula. (3) Operative trauma producing stricture with jaundice. A review of the sixty-four case records at the Mayo Clinic reveals the fact that a number have developed several years after cholecystectomy. While trauma undoubtedly is responsible for a number, yet cholangitis is the most frequent factor. When the stricture is the result of an obliterative cholangitis, the obstruction is as a rule not complete. The duct appears as a rounded opening in the liver, and these are best dealt with by a side-to-side anastomosis of the duct stump to the duodenum over a tube.

Stricture with biliary fistula is most favourable for operation. The serum bilirubin should always be estimated. The fistula may be dissected out and anastomosed to the duodenum as done by Murphy and Lahey. A stricture of the structures may ensue. The author believes the best results are obtained by anastomosing the stump of the duct to the duodenum.

Stricture of the duct with immediate bile retention and consequent jaundice gives the case with the most operative risk, and such a case requires preoperative medication and repeated blood transfusions. Here again anastomosis of the duct to the duodenum is the ideal.

The author's conclusions may be summarized as follows: Obliterative cholangitis is the cause of the stricture in a number of cases formerly classified as traumatic. Stricture of the duct with biliary fistula may be deceptive, as a biliary cirrhosis may be present. Preoperative and postoperative care is essential in cases with jaundice. Direct anastomosis of the stump of the duct over a tube to the duodenum is the best method of treatment.

R. V. B. Shier

PÆDIATRICS

Protein Requirement as Determined in Diabetic Children. Bartlett, W. M., *Am. J. Dis. Child.*, Nov., 1926.

Children require more protein than adults because they must grow and develop. How much more was the problem investigated. Definite metabolism periods were marked off, during which food nitrogen, stool nitrogen and urinary nitrogen determinations were made. Nitrogen balance was calculated by subtracting the urinary and fecal nitrogen from the food nitrogen.

Tables are given in which positive nitrogen balances, growth in weight and height are maintained on diets of protein per kg. of body weight containing 0.9 grm., 0.6 grm., 1 grm., 0.9 grm., 1 grm., 0.7 grm. with calories per kg. of body weight respectively 90, 60, 105, 90, 90, and 80.

It appears probable that actual minimum protein requirement in children falls from 1.5 grm. per kg. during the first year almost directly proportional to the diminution in the rate of growth, inversely proportional to the age and inversely proportional to the calories given per kg. for any age until after adolesence, when the requirement reaches that of the adult 0.66 grm. per kg. of body weight.

It is common experience that diabetes usually occurs in children who approach the upper normal limits in height at the onset of their disease, and if they are not accurately controlled do not grow in stature at the usual rate. From this study it appears that their growth in stature is dependent on their accurate control.

Conclusions: (1) Children between the ages of four and fourteen maintain a positive nitrogen balance, grow in stature, gain in weight at a normal rate and develop normally when supplied with 0.6 to 1.0 grm., of protein per kg. of body weight provided (a) that their caloric requirement is fulfilled and (b) the diet is adequately chosen from foods rich in vitamines.

2. The protein requirement of children is a function of the ingested calories, varying inversely with the caloric intake.

3. The protein requirement of children bears no relationship to the fatty acid—glucose ratio, provided it is compatible with a persistent absence of ketosis.

4. The protein requirement of children varies inversely with the age, and is directly proportional to the rate of growth.

5. It is possible (and in certain cases of diabetes mellitus and chronic nephritis it may be advisable) to feed diets much lower in nitrogen than is usual. Provided the caloric requirements are fulfilled, the diet is rich in vitamines and is adequately chosen from vegetable and animal sources, no evidence of protein starvation will be manifest. LILLIAN A. CHASE

Observations on the Rheumatic Nodule. Coates, V., and Coombs C. F., *Arch. of Dis. in Childhood*, Aug., 1926, i, 183.

The article begins with an extensive review of published observations on the occurrence of rheumatic nodules, from their first description by Froriep in 1843, to date, from which the authors conclude that if there is any one lesion that is characteristic of rheumatic infection, and of severe infection at that, it is the rheumatic nodule. To this view are added some facts that tend to broaden the picture and at the same time blur its outlines a little.

Their studies show that submiliary, subcutaneous nodules, consisting microscopically of a fibrinous core, an intermediate zone with exuberant formation of fibroblasts and endothelial cells, and an outer zone of newly formed fibrous tissue and capillary blood vessels, are to be found not only in active rheumatic infections but also in smouldering cases, in cases of so-called rheumatoid arthritis, in Still's disease and endocarditis lenta. No organisms other than streptococci of low grade virulence are known to produce a like tissue response to that described above. Subcutaneous nodules of the millet seed order indicate that the barriers of immunity are being successfully assailed and that the result hangs in the balance; either the defence mechanism will recover from its partial dislocation, or some added factor, such as a chill, will put it altogether out of gear. Another point which emphasizes the authors' thesis, namely, that the subcutaneous node is not a simple index of rheumatic infection, is the fact that nodes may occur much more frequently in some years than in others. This cannot be ascribed to more careful scrutiny, neither is it wholly explained by an increased severity in the type of the rheumatic infection. They conclude that rheumatic infection is the outcome of many factors; the form of the reaction to infection with streptococci (of a low virulence), and the infection itself, being the resultant of a number of forces.

R. R. STRUTHERS

Above all, Canada amongst the self-governing nations of the Empire has a position and a mission like no other. For three thousand miles her open frontier marches peacefully with that of the American Republic. If she can rise to the highest view of her destiny she will work deliberately, steadily, to harmonize her intimate neighbourhood to the United States with her membership of the British Empire, and to draw the two systems into a working fellowship which would lead the world.—J. L. Garvin in the *London Observer*.

Obituaries

Francis Mitchell Caird, M.B., C.M., F.R.C.S.E., LL.D. The Grim Reaper has wrought sad havoc of late amongst the profession in Edinburgh. Those who have bowed before his stroke since the close of the war include such widely known men as Professors Francis D. Boyd, James Ritchie, Sir Halliday Croom, John Chiene, Alexis Thomson, Hunter Stewart, Sir Isaac Bayley Balfour, Sir Thomas Fraser and A. R. Cushny, Doctors Berry Hart, J. W. Ballantyne, Harry Rainy, Claude B. Ker and John Thomson, and Sir James Affleck. What a list! And now Caird is gone. Without either panegyric—Caird would have detested such—or wealth of biographical and academic detail, the pupil may be permitted to pay lawful tribute to the memory of his respected teacher.

F. M. Caird was one of the foremost surgeons in Edinburgh in his day and from 1908 to 1919 he occupied the Regius chair of clinical surgery in that university—the chair made famous by Syme and Lister. The latter was succeeded by Thomas Annandale, renowned as the originator of the treatment of injured knee joint cartilages by open operation, and for many other surgical advances; Caird succeeded Annandale and upon his retiring was followed by Sir Harold Stiles.

In his student days Caird was class assistant to the professor of botany, John Hutton Balfour (nicknamed "woody-fibre"), father of Sir Isaac Bayley Balfour mentioned above, who succeeded him in the chair of botany. The lifelong influence of that early association may be recognized, and one side of Caird's character stands revealed, by the fact recorded in the *Reminiscences of a Student's Life in Edinburgh in the Seventies,* that while in France as a consulting surgeon during the war he "caused gardens of Edinburgh bulbs to be planted almost in our front line. These bulbs were sent to him by Professor Balfour and bloomed profusely, giving our soldiers a truly beautiful flower message from the loved ones at home."

Caird graduated in medicine at the University of Edinburgh in 1877. As a student he worked in Lister's wards, and in John Chiene's *Looking Back* there is a photograph of Lister's clerks and dressers in 1875 in which one sees Caird, together with his classmate and life-long friend and fellow-disciple of Lister, John Stewart of Halifax; in the same group are Berry Hart, the obstetrician and gynæcologist and Sims Woodhead, the pathologist. After graduation, Caird was Chiene's first house-surgeon and, remaining in Edinburgh, he steadily climbed the ladder which led to the chair formerly occupied by his beloved master, Lister.

Quite recently Professor Caird sent some of Lister's precious specimens to Dalhousie University through Doctor Stewart; and in view of the prominent place which he would have occupied and the happiness which he would have found in the Lister Centenary celebration to be held in Edinburgh next summer, his death at this time comes with peculiar sadness.

Concerning Caird as a surgeon one cannot do better than quote his distinguished successor Sir Harold Stiles, who in his *Reminiscenes of a Surgical Training* writes: "Lister's love of surgery was well known. Caird's is certainly no less profound. . . . It was during the decade following my house surgeonship that abdominal surgery was making such great developments. This department of surgery appealed to Professor Caird's technical dexterity and artistic temperament. . . . He became the pioneer of abdominal surgery in Edinburgh; indeed, I should say one of the pioneers in this country."

As an operator he was courageous, brilliant and resourceful, never more so than when the case was unusually difficult or when an emergency arose. He retained Lister's preference for open chloroform as an anæsthetic, save under certain circumstances.

As a teacher of clinical surgery Caird was superb. He devoted himself to giving his students the best surgical training possible, and many an inconvenience did he suffer cheerfully to that end. His students were made to feel that the standard set before them was high and well worth striving to attain. His attitude towards them is indicated in a statement which he made on the occasion of his last clinical lecture to the effect that what he would miss most in his retirement would be the stimulus of daily intercourse with so many young people.

His clinical lectures were models. His vast knowledge and sound judgment found expression through a style of English unique in its lucidity and unsurpassed in its scholastic beauty. Doubtless his familiarity with foreign languages contributed in no small measure to his mastery of his own. He was keenly interested in the history of his subject, as was evident in his introductory address on "Some points in the evolution of surgery in Edinburgh" (*Edinb. M. J.*, Nov., 1908), but he exercised discrimination and restraint regarding the proportion of historical matter which he presented to his students. He was a past master of the art of discussing a case before the patient without permitting the latter to divine the purport of what was being said; in this connection he never used such words as stomach, liver, kidneys, employing instead phrases such as the gastric organ, the hepatic organ, the renal organs. In these days when lectures are the object of so much destructive criticism, some of it doubtless merited, it may not be without profit, and certainly it is not without pleasure, to recall such lectures as Professor Caird's—magistral, stimulating, intellectual treats, things of beauty at the time and joyful memories forever.

Caird taught no less by example than by precept; his works were no whit less practical than his faith was lofty. Daily contact with such a personality has left its indelible mark upon the character of many a grateful student to whom his memory will ever remain an inspiration.

Happy the school that can produce such men and retain them on its staff; and when from failing hands they throw the torch to us, the medical teachers of a younger generation, what will its fate be in *our* care?

I. MACLAREN THOMPSON

An Appreciation of Professor Francis Mitchell Caird, by Dr. John Stewart of Halifax

The news of Professor Caird's death came as a painful surprise and a sense of personal loss to many in this country. Some of us had made his acquaintance and benefited by his teaching in the wards of the Royal Infirmary in Edinburgh, and many had happy memories of his visit to Canada in 1905 when he delivered the Address in Surgery at the meeting of the Canadian Medical Association, which took place in that year in Halifax.

Caird was a man of amazing energy and tireless capacity for work, but his work was thorough. His friend Dr. Thin writes, "Nothing slipshod, superficial

or showy ever passed from his hands and his whole life was a constant earnest search after truth, truth in action, truth in word, truth in life.'' One of his mottoes was ''Work, and work hard, for the work's sake.'' In the last letter the writer had from him he says, ''Love and Faith are in Lives''. Like all great teachers he inspired his students with something of his own spirit. Only a few weeks ago one of his old students, now holding an important appointment in a Canadian University said, ''every day of my life the thought of Mr. Caird is an inspiration to me.''

He was a man of wide interests in literature, music and art. Dr. Thin writing in the *Scotsman* says ''Full though his days were with the duties of teaching and the claims of practice he made time for cultivating other congenial interests. He had a wide knowledge of art ancient and modern, and he had a skill in drawing which he put to good use in his daily work. Immediately after any unusual operation, no matter how busy he was, he took time to make a sketch in colours of what he had found at the operation and what measures he had adopted to put things right.''

His happy spirit, his endless stores of anecdotes from all sources, his keen sense of humour, and his gift of song will be sadly missed in the social gatherings of the medical profession in Edinburgh.

He had many gifts, perhaps the greatest was his gift of friendship. He gave himself to his friends. He had a great heart.

''And none that knew him need be told
A warmer heart, death ne'er made cold.''

After his retirement from practice he removed from Charlotte Square to a house on Royal Terrace, abutting on the beautiful Calton Hill Park, from which there is a wonderful view of the Forth. Here he devoted much time to his flower garden in which he took a great delight. Old friends sent him roots and plants from all parts of the world, and he was much interested in attempting the cultivation of some flowering plants from Nova Scotia, among which were the Epigæa, Linnea, Mitchella, Coptis, etc.

Symptoms of myocardial trouble had been occasionally apparent for some time, but nothing damped his cheery spirit or interfered with his correspondence and his beloved garden. He took great interest in the preparations for the Lister Centenary to be observed in Edinburgh next year in connection with the meeting of the British Medical Association, and it is very fitting that the last work in which he was engaged was the preparation of an article on ''Reminiscences of Lister'' for the Memorial Volume to be published at the Centenary. The article had been prepared, and part of it was already typed. It was lying on his study table on the day of his death.

He was in his happy, even merry humour. He sat down to have a cup of tea. Then the Call came. ''The cup that was at his lips he carefully replaced, his head sank forward, and he passed peacefully to his Maker.''

''In everything Caird was generous to an extreme degree; many suspected but only those intimately associated with his private work knew the extent of this. To the wounded officer who insisted on being treated as a private patient, and making due recompense, he replied, 'I have operated on you; you have fought for me, and I am still your debtor'.'' (*Brit. M. J.*, Nov. 13, 1926, 912.)

Dr. George Wilbur Graham, Chief Coroner of the city of Toronto, who died on November 8th, 1926, was born in Toronto, April, 1876. His early education was received in the public schools and collegiate institutes. He matriculated in 1894 in the University of Toronto from which he graduated in arts in 1897 and in medicine in 1900. After spending a year as resident physician and resident surgeon in St. Michael's Hospital, he began private practice in Delhi, Ontario, but soon returned to Toronto where he found a wider field for the exercise of his ability.

It was in forensic medicine that he became especially known. In 1905 he was appointed associate coroner, and in 1921 was chosen by the provincial government to succeed the late Dr. Arthur Jukes Johnson as chief coroner for Toronto. His inquests were always conducted with dignity and expeditiously, owing to his faculty of quickly eliciting important facts bearing on the cases under investigation. At every inquest his constant consideration for the feelings and sensibilities of bereaved relatives and friends was a matter of note. In other courts his services as an expert witness were often sought, and in this capacity he gained a reputation for the possession of fairness, sound knowledge, and common sense. As a citizen he was much respected.

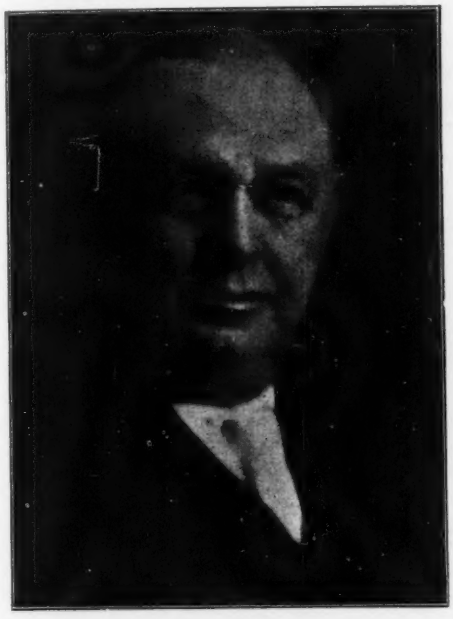
DR. GEORGE WILBUR GRAHAM

In addition to his work in medical jurisprudence he occupied the positions of physician to St. Michael's Hospital and chief advisory medical officer to the Toronto Transportation Commission, while at the same time he carried on a private practice of considerable proportions. He was for some years medical officer to the 110th Irish Regiment and the 208th Irish Battalion. As chief medical officer in Toronto he was for five years associated with Prof. H. E. T. Haultain in the Department of Soldiers' Civil Re-establishment, and was much interested in the introduction of occupational therapy into the military and civil hospitals.

He was a member of the Canadian Club, the Royal Canadian Yacht Club, the Albany Club, the Briars Golf and Country Club, and the Toronto Board of Trade.

In religion he was an Anglican. He is survived by his wife and one son and a daughter. J. L.

Dr. Gideon Silverthorn, chief of the Surgical Staff of St. Michael's Hospital, Toronto, Associate Professor of Clinical Surgery and Professor of Jurisprudence in the University of Toronto, died on December 4, 1926, of intestinal obstruction secondary to an operation for gangrenous appendicitis.



DR. GIDEON SILVERTHORN

Dr. Silverthorn graduated from the University of Toronto in 1889; after which he spent three years in post-graduate study in Europe. Two of these years were spent in the study of pathology under Von Recklinghausen in Strasbourg. Shortly after his return he began general practice in Toronto, and became Senior Demonstrator in Pathology in his Alma Mater. For several years he was Lecturer in Surgery in the Women's Medical College, and continued as Demonstrator of Clinical Surgery when the University of Toronto absorbed the Women's Medical College, and the Medical Faculty of Trinity. He was attached to St. Michael's Hospital for nearly thirty years, and succeeded the late Dr. Walter McKeown as chief surgeon in 1925.

Dr. Silverthorn was a thoroughly trained surgeon, and practised as a specialist since 1908. As a consultant he was known all over Ontario, and his judgment was proverbial among those who knew him best. As a teacher he exhibited unusual gifts, and his clinics were always crowded. His colleagues in the university and, especially, his associates on the staff of St. Michael's Hospital held him in the highest esteem and in genuine affection.

In 1925 he married Dr. Victoria Reid, a graduate in arts and medicine from Queen's University who had practised in Toronto for some years.

His funeral was held in the Convocation Hall of the university where the president, Sir Robert Falconer spoke of the loss of a great and good man, a brilliant teacher and a devoted scientist.

MALCOLM H. V. CAMERON

Dr. Harry T. Arnall died in Barrie on November 16th. Graduating at the University of Toronto Medical School in 1890, he practised in Allandale and Barrie for thirty years and was well known in many connections. In addition to his activities in practice, in the Victoria Hospital, and in the Simcoe Medical Society, Dr. Arnall was a lover of music, and had been choirmaster at Trinity Church, for twenty years and had at times conducted the Barrie Citizens' Band.

Dr. John Wallace Coffin, whose death after a long illness from chronic nephritis, occurred at his home in Rossland on November 21st, was born at Mount Stewart, P.E.I., in 1875. After a preliminary education at Prince of Wales College, Charlottetown, he taught school for several years before proceeding to McGill University where he graduated in 1904. After a year in surgery with the late Professor A. E. Garrow in the Royal Victoria Hospital, he went to Cranbrook where he acted as assistant to Drs. J. H. King (now federal minister) and F. W. Green. For the fifteen years previous to his death he practised in Rossland, where he enjoyed a very large clientele, drawing patients from all over the province. He was especially interested in surgery and was very successful in almost all his operations. His advice was always sought by his colleagues in any difficult case; his reputation as a surgeon was second to none in the interior of British Columbia.

As a man, his friendship was valued by everyone with whom he came in contact, and although he was perhaps really intimate with only a very few, by these he was beloved. Funeral services were conducted under Masonic auspices and burial was at Vancouver. He is survived by his mother, wife and two adopted children. The district mourns the loss of one whose greatest pleasure was in helping others.

Dr. Marshall B. Dean died at Fort William on December 8th after a short illness, aged fifty-six. One of the best known physicians in the district he was the past chairman of the medical staff of the McKellar Hospital and was a past president of the Thunder Bay Medical Society.

Dr. E. A. P. Hardy, son of the late Hon. A. S. Hardy died in Toronto on December 9th after an illness of three weeks' duration. Beginning his medical studies in Toronto Dr. Hardy completed his courses in Chicago at Henrig College coming back to Toronto in 1900 and beginning practice there. Though conducting a large practice Dr. Hardy found time to take an active interest in the affairs of the medical council of Canada and was the homœpathic representative on the Ontario and Dominion examining boards. He served for three years overseas with the C.A.M.C.

Dr. Vernon Laurie Miller, of Halifax, died very suddenly on the evening of November 11th. Although a few friends knew of a heart lesion, the significance of which was quite apparent to Dr. Miller, to most folk he always seemed the embodiment of health and vigour, and the abrupt termination of a career which gave every promise of the greatest usefulness was a severe shock to a wide circle of friends. Dr. Miller had practised in Halifax only about eleven years, but in that short time his academic and professional qualifications, his accomplishments, and above all his sincerity, kindliness and sturdy personality had won for him the confidence and esteem of all who had made his acquaintance. He received the arts degree at Acadia University, after which he began medical studies at McGill University, where he graduated in 1904. He then spent several years at country practice, and, in 1914, went abroad for graduate work. In the following year he was awarded the F.R.C.S. (Edin.).

Subsequently he acquired the F.A.C.S., and was in attendance at the recent meeting of the College at Montreal. He was a valued member of the medical faculty of Dalhousie University, and of the staff of the University Health Centre, and was actively identified with a number of philanthropic organizations. The Halifax daily papers, in extended references to his life and death, laid emphasis on his stirling character and professional standing, and on the widespread sorrow occasioned by his death.

Dr. H. W. Scott died at the family residence, 34 Carlton St., Winnipeg on December 14th. A son, Herbert Winfield Scott is in the fourth year of medicine in the University of Manitoba.

Dr. Harold Chapman Steeves. The death of Dr. Steeves of New Westminster was received with unusual regret by his friends in New Brunswick. Dr. Steeves was a native of Hillsboro, Albert County, N.B. At the time of his death, he was superintendent of the Provincial Asylum for the Insane of British Columbia, and had done very considerable and commendable work on a commission for the British Columbia Government concerning the handling of the insane in that province.

Dr. David H. Wilson died at Vancouver, B.C., on December 10th. He graduated from Trinity College, Toronto in 1878 and sat in the Manitoba Legislature from 1881 to 1887. He was Provincial Secretary and later Minister of Public Works under the late Premier John Norquay. He was also one of the incorporators of the Manitoba Medical College and did much to facilitate the passage of the Act of Incorporation through the house in 1883. He had resided in Vancouver for the last thirty-five years.

News Items

ACKNOWLEDGEMENTS

We always take pleasure in acknowledging receipt of our provincial society bulletins, but wish to notice especially the November and December numbers of the *Nova Scotia, Vancouver* and *Manitoba Medical Association Bulletins.* They include case reports, with full discussion; notes of historical interest; comments on recent work in preventive medicine and therapeutics; abstracts from current literature; and even reflections on that thorny subject medical education. One of the most important matters brought before the College of Physicians and Surgeons of Manitoba was Dr. Thornton's report on proposed changes in the Medical Act. It was recalled that on a previous occasion certain legislative proposals had been successfully dealt with by careful and thorough explanation of what they entailed. It was decided therefore to bring the present proposals before the profession of the province by means of a questionnaire.

The December number of the *Vancouver Medical Association Bulletin* gives an interesting account of the post-graduate tour of three Winnipeg doctors through the interior and northern British Columbia under the direction of the Committee on Post-Graduate Instruction of the Canadian MedicalAssociation, through the generosity of the Sun Life Assurance Company.

GREAT BRITAIN

Dr. Fridzofz of Nansen was installed as rector of the University of St. Andrews on November 3rd after having been admitted to the honorary degree of doctor of laws.

At the annual meeting of the Royal Society of Edinburgh held on October 25, Sir James Alfred Ewing, principal of the University of Edinburgh and formerly professor of engineering, was elected president.

Sir Thomas Oliver has been elected to succeed Sir David Drummond as president of the University College of Medicine at Newcastle. Sir David Drummond has been a member of the council of the college for forty-seven years, and became president in 1918.

Dr. L. E. Barnett, emeritus professor of surgery at the University of Otago, New Zealand, visited the Mayo Foundation during the week of November 7. He was returning from a trip to England, where he attended the meeting of the British Medical Association. Dr. Barnett is president of the Australian branch of the British Medical Association.

The Lister Medal for distinguished contributions to surgical science, with the honorarium of £500, has been awarded by the committee of representatives from the Royal Society, the Royal Colleges of Surgeons of England and Ireland and the Universities of Edinburgh and Glasgow to Professor A. F. von Eiselsberg, of Vienna. This is the second award of the medal; the first was to Sir William Watson Cheyne. An address is to be given by Professor von Eiselsberg at the Royal College of Surgeons of England, in accordance with the conditions of the trust, on July 7, 1927.

A replica of the portrait of the late Sir Richard Douglas Powell, by Spencer Watson, was presented to the Royal College of Physicians by his son, Sir Douglas Powell, at the quarterly meeting of the college on October 29.

AUSTRALIA

In describing his recent trip to the Antipodes Dr. M. T. McEachern makes the following comments:

Medical and hospital conditions in these countries are quite different in some respects to those in Canada. Like members of the Canadian profession, the members of the New Zealand and Australian professions are

of high type. Generally speaking, almost all of them further their fundamental education and experience by post-graduate work abroad, acquiring English or American degrees for advanced study. Up to the present, at least, I feel certain that a greater number relatively of the medical profession of Australia and New Zealand take up post-graduate work than those in America.

The Medical Practice Acts of these countries are rigidly carried out, there is no parleying or lobbying with the irregular in any form. His case is soon dealt with and he finds himself out of business. High standards of practice are strictly adhered to. In Australia, however, and in New Zealand possibly to a lesser degree, the herbalist is the greatest pest. He is cunning and difficult to catch, but perhaps less harmful than certain other forms of irregular practitioners with which we in America have to contend.

The State of Victoria presents rather interesting hospital and medical conditions. The hospital system is voluntary in type, subsidized by governmental and municipal aid as may be required in addition to fees from patients, earnings from hospital departments, endowments, and other sources. Financial support is contributed about as follows: Voluntary contributions, one-third; fees from patients and earnings from hospital departments, one-fourth; government subsidy, one-sixth; municipal subsidy, one-fortieth; other sources as endowments, rentals, etc., nine-fortieths. Each institution has a carefully selected board or committee of management with full autonomy operating under a general policy as laid down and controlled through a representative non-political state board. There is no attempt at nationalization of medicine or hospitals in Victoria—as in New Zealand. In fact, Victoria appears to have an antipathy for nationalization of this kind. The hospitals of Victoria are created according to the needs of the community. These are as follows: metropolitan, base, district, cottage, and bush nursing centres. Distribution is made according to a well-thought-out plan, carrying hospital service right into the back blocks of the country. The entire system is very thoroughly co-ordinated and characterized by those fundamental principles so essential to hospital progress, namely: co-operation, efficiency, economy, and service. (*Vancouver Med. Assoc. Bull.*, November, 1926.)

NOVA SCOTIA

The semi-annual meeting of the Provincial Medical Board was held on the 17th of November. Only routine business was transacted. There was a good attendance of the various members.

Dr. Weatherbe was host to the Osler Medical History Club, of Halifax, on the occasion of the November meeting. His paper on Fergusson set forth very delightfully the characteristics and accomplishments of that great surgeon.

Dr. A. H. Gordon, of Montreal, and Dr. J. G. MacDougall, of Halifax, made up a team of extramural lecturers under the Canadian Medical Association scheme who addressed local medical societies at Yarmouth, Bridgewater, Truro, Sydney and New Glasgow during the week beginning November 29th.

The vital statistics of Nova Scotia for the month of July are summarized in the November issue of Public Health Notes. Contrasted with July of 1925, there was a sharp rise in the number of deaths from pneumonia and tuberculosis. In respect of other communicable diseases there was little difference in the corresponding months. The births totalled 931; the deaths, 427. The infant mortality rate was 55,8, as compared with 65.2 in July, 1925.

An action for $5,000 damages, brought against a Halifax dentist by the mother of a young woman who died while being anæsthetized in the dentist's chair, has resulted in a verdict in favour of the defendant. The plaintiff based her case on negligence. The evidence showed that a qualified medical practitioner (the late Dr. Daley) had been the anæsthetist. Several medical witnesses testified that the procedure followed by Dr. Daley, as described in the court, was in accordance with good practice. The judge's charge was distinctly favourable to the defendant, and the jury found the charge unproven.

The organization of the various portions of the province in the plan for combating tuberculosis is going steadily forward. The commission has appointed Miss Janet Mortimer to succeed the late Mrs. Mader as secretary. Miss Mortimer was on the staff of the Nova Scotia Sanatorium for sometime, was associated with Dr. A. F. Miller in the authorship of *The War on Tuberculosis*, and has had considerable experience in administrative and secretarial work. Dr. Joseph Hayes is undertaking the work of organization in the towns and municipalities. The profession is co-operating in every possible way, and the results are such that the success of the undertaking may now be regarded as assured. A sale of Tuberculosis Christmas Seals is included among the methods of raising funds.

At the annual meeting of the Halifax Children's Hospital, held on the ninth of November, it was reported that demand for accommodation is now greater than can be met by the institution, and that enlargement is urgently needed. During the year 573 patients were admitted. There are fifty cots in the hospital, but inasmuch as several of the patients are treated on trucks and kept on the verandahs, it has been possible on several occasions to have as many as sixty patients in the hospital. It is proposed to endeavour to secure funds to enlarge the hospital to twice its present normal capacity. The financial statement for the year indicated that the income was not quite sufficient to meet all expenses. The endowment fund is growing slowly, and now amounts to approximately $70,000.

Dr. George H. Murphy, of Halifax, has been appointed to represent the medical profession on a commission selected by the provincial government to inquire into the problems of feeble-mindedness in Nova Scotia. A survey of the province is being made by Doctors Hincks and Mitchell, of the Canadian National Committee for Mental Hygiene, each of whom has a competent psychiatric social worker associated with him. Representative sections of the province are being systematically studied, the purpose being to secure findings which may be legitimately considered as applicable to the province at large. For several years considerable pressure has been brought upon succeeding governments to make institutional pro-

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vision for at least such of the feeble minded as might benefit thereby, and it is hoped that definite action in this direction will follow the present investigation.

Suitable exercises marked the graduation of nurses from the training schools of the Nova Scotia Hospital and the Victoria General Hospital on the seventeenth and the twenty-third of November respectively. At the Nova Scotia Hospital, the chair was occupied by Hon. W. L. Hall, the attorney-General of the province, who referred to a recent survey of Canadian institutions for the insane which placed that hospital in the front rank. The graduates were addressed by Dr. H. K. MacDonald, who emphasized the high ideals of the nursing profession and urged the graduates to keep those ideals ever foremost in their thoughts and aspirations. The exercises at the Victoria General Hospital were presided over by Hon. George E. Faulkner, and the address to the graduates was delivered by Dr. K. A. MacKenzie. Dr. MacKenzie traced briefly the developments in medicine which made the nurse so essential to the physician. In speaking of the need for professional efficiency, and therefore for a high qualifying standard, he urged that the cultivation of the human side must still be regarded as of highest importance. W. H. HATTIE

NEW BRUNSWICK

The New Brunswick Medical Society wishes members of the Canadian Medical Association and the various provincial medical societies, a very happy and prosperous New Year.

The speakers for the November course of extramural lectures were: Dr. Fraser B. Gurd, Montreal, and Dr. E. Stanley Ryerson of Toronto. Dr. Gurd outlined the course of treatment of compound fractures as followed by him in the fracture clinics in the Montreal General and Western Hospitals. The chief points in the treatment were: 1st. complete debridement. 2nd. Reduction of deformity. 3rd. Debridation. 4th. Bipp. 5th. Tight packing with gauze. 6th. Absolute immobilization. More than the usual interest was evinced in Dr. Gurd's talk, both on account of the manner of presentation and the excellence of the material and because the local surgeons are now entering upon the winter season which provides a greater number of such fractures both in private and in industrial practice. Dr. Ryerson who is a fluent and able speaker, revised diseased conditions of the biliary tract. In the past year, two or more speakers have covered the same ground but Dr. Ryerson, representing the Toronto School of Medicine, brought out several new points which were of interest.

The General Public Hospital has recently installed a new department to handle basal metabolic estimations. This department will be under the control of Dr. H. Abramson, the pathologist.

The prevalence of scarlet fever throughout New Brunswick is quite a noticeable feature during the last two months. It is not confined to any one locality and involves rural districts as well as the cities. The New Brunswick Department of Health has been active in reporting cases and has been most generous in dispensing serum for prophylaxis and for therapy. The type of disease is mild which renders early diagnosis unusually difficult.

During the last month, the committee appointed at the Moncton meeting of the New Brunswick Medical Society, has circularized the entire profession in New Brunswick with regard to membership in the Canadian Medical Association, with quite gratifying results to date.

The Provincial Government has appointed Dr. G. C. McLean as a second travelling diagnostician of tuberculosis in New Brunswick. He will be associated with Dr. Wherritt Warwick. Dr. McLean has had a very large experience in tuberculosis both at Muskoka and at River Glade. His appointment is popular and the profession wishes him every success.

Dr. H. I. Taylor, New Brunswick Provincial Minister of Health, was operated upon at the General Public Hospital on December 3rd for a serious abdominal condition. His progress, so far is favourable.

Dr. Margaret Parks has returned to St. John in connection with her work for the Canadian Emigration Department. Dr. Parks spends the summer months doing similar work at Quebec.

The hospitals of New Brunswick, and especially the Chipman Memorial of St. Stephen, lost a much appreciated friend by the death of Mr. J. T. Whitlock of St. Stephen. Mr. Whitlock, although largely engaged in financial affairs in this province, devoted a large part of his time to the welfare of the hospital in his home town. Many of the improvements in the Chipman Memorial were directly attributable to his efforts. A. S. KIRKLAND

QUEBEC

QUEBEC CITY

Professor Rousseau, Dean of the Medical Faculty of Laval University, is in Paris where he represents the Dominion, the Province of Quebec and Laval at the Celebration of the Laennec Centenary in the Sorbonne and the Academy of Medicine.

The Laennec Centenary was also celebrated in Quebec. Professor Vallée of Laval gave a public lecture at the Institut Canadien on the discoverer of auscultation, and the members of the "Cercle Laennec", a medical students' association of medical and literary interest, held a public meeting in the festival hall of Laval under the patronage of the Rector Mgr. Roy. Three interesting papers were read on the life and scientific work of this French pioneer of the pathology who may be considered with Sydenham as the creator of the modern clinic.

On Thursday, December 16th, their Excellencies Lord and Lady Willingdon visited Laval University,

where the Governor-General was given the diploma of Doctor in Law *honoris causa*. The Archbishop of Quebec, the Chancellor and Royal Visitor of the University, the Rector of Laval and professors and students of all faculties were present at the reception which took place on this occasion.

The number of medical students at Laval has largely increased during the last five years. During the present session two hundred and twenty-three students have matriculated divided thus among the five years: first year forty-seven, second year fifty-six, third year thirty-three, fourth year fifty, fifth year thirty-five. A. VALLEE

MONTREAL

The attention of the Mayor and the City Executive Committee has been drawn to the immediate need of the appointment of a bacteriologist, in a resolution passed at the meeting of La Societe Medicale held recently and forwarded to the City Hall. In explaining its action, the society draws attention to the fact that the post has remained vacant since the death of Dr. H. Larouche four years ago, and that in the best interests of the general public health, it is essential that it be filled without delay.

Dr. Conrad Pelletier, forty-five years of age, residing at St. Lin, Que., a physician well known in Montreal, was killed instantly when his light automobile was struck by a train at a crossing three miles from Joliette, Que. Dr. Pelletier was alone in his automobile at the time of the accident. He had attended a meeting of the Medical Society of the District of Joliette, and was returning to Montreal.

Dr. F. J. Shepherd, F.R.C.S., one of Montreal's prominent professional men, and a surgeon of international reputation, celebrated his seventy-fifth birthday recently. Dr. Shepherd is an outstanding figure in the surgical profession and has been honoured by many universities, not only in his own, but in other countries. Although he retired from active practice several years ago, his counsel is frequently sought, and he still takes a keen interest in the surgical departments of local hospitals.

Dr. Edward Archibald has recently been honoured by the New York Academy of Medicine, and received congratulations from his surgical colleagues in the city at a dinner in the Mount Royal Club given in his honour. Dr. Archibald is the second Canadian to be so honoured by the New York Academy of Medicine. The first was Sir William Osler. Their names are additions to a notable list which includes such men as Lister, Koch, MacEwen, Moynihan, Matas, Welsh and Roux.

Dr. Auguste Petit, a noted French authority on tuberculosis, is shortly leaving the University of Montreal, after directing experimental work here.

Brig.-Gen. H. S. Birkett, has been appointed honorary physician to His Excellency Lord Willingdon.

The Rockefeller Foundation of which Dr. Vincent is president, contributed $500,000 to the new university mental clinic at McGill. Prof. Meakins is at present in charge of it and, since its organization the work carried on in it has reached a high standard. A number of Canadian graduates are at present enjoying the privileges of scholarships under the Rockefeller Foundation Fund, and are undertaking special studies in various departments of medicine. Dr. Vincent, president of the Rockefeller Foundation addressed a large public gathering in Montreal on the 10th instant and in reply to questions, said that the Foundation was now disbursing approximately $8,000,000 each year in various ways in many parts of the world, and was working with governments and universities for the furtherance of medical research, the increase of knowledge and general hygiene. Owing to their widespread activities, it was obvious that the chief rôle of the Foundation was to grant necessary assistance to struggling but deserving institutions but not to be entirely responsible for them. "We try to help and hasten developments which without our aid might be delayed somewhat," said Dr. Vincent, in closing his address. GEORGE HALL

ONTARIO

The annual meeting of District No. 1, Ontario Medical Association was held at Chatham on October 13th. The arrangements were in the hands of the Kent County Medical Society.

Dr. Alfred J. Grant, district counsellor occupied the chair. Col. Lyle Cummins, Professor of Tuberculosis, University of Cardiff, Wales, opened the proceedings with an instructive address on the subject of "Silicosis," in which many new and original ideas were presented to the meeting.

Dr. William E. Lower of Cleveland addressed the meeting upon the subject of "Pyuria."

Dr. T. C. Routley, Secretary of the Ontario Medical Association, addressed the meeting, touching upon the general activities of the Ontario Medical Association.

A very happy climax was provided in the talk on "Pre-operative and post-operative treatment," by F. N. G. Starr, President, Canadian Medical Association.

The attendance taxed the capacity of the hall. London, Windsor, St. Thomas and Chatham were represented in large numbers while nearly all the smaller places sent their quota.

The annual district dinner was held at the Gray-Dort Club. Dr. Edgar Brandon, of North Bay, President of the Ontario Medical Association addressed the gathering. The work of the Ontario Medical Association was reviewed and some excellent ideas were brought forward which should help much in our campaign for greater membership.

The Harvey Club of London met on Thursday evening, November 25th and were addressed by Dr. C. M. Crawford of Toronto who took as his subject for the occasion "A simple classification of the psychoses with presentation of representative types."

At the stated meeting of the Academy of Medicine of Toronto on December 7th, Dr. John A. MacGregor of London, the guest of the evening spoke on the subject of "So-called indigestion."

The Wellesley Hospital of Toronto had the following programme at the meeting of its clinical society on November the 18th: 1. Traumatic rupture of the duodenum, by Dr. George Philp. 2. Angina pectoris, (specimen) by Dr. G. W. Ross. 3. Two cases of renal

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tumour, by Dr. H. B. Anderson. 4. X-ray treatment of carcinoma of the breast, by Dr. H. Tovell.

The South Waterloo Medical Society held their regular meeting at Galt on November 4th, when the following programme was given: Address on "Chronic rheumatism," by Dr. A. A. Fletcher of Toronto. Clinic on skin diseases, conducted by Dr. E. J. Trow of Toronto.

Dr. Geo. S. Young of Toronto addressed the St. Thomas Medical Society on November 5th, his subject being, "Some common mistakes in diagnosis and treatment."

The Oxford County Medical Society met at Woodstock on November 5th, Dr. G. A. McLarty gave a talk on "The examination of the nervous system."

The Victoria County Medical Society met at Lindsay on November 5th. Dr. Geo. E. Wilson of Toronto gave an address on "The treatment of fractures," followed by a talk on "Diet and insulin in the treatment of diabetes mellitus," by Dr. A. A. Fletcher of Toronto.

On Friday, November 5th, the Grey County Medical Society met at Owen Sound. Dr. Fulton Risdon of Toronto gave an address on "Tumours of the jaws," followed by an illustrated talk by Dr. H. A. Dixon of Toronto on "The diagnosis and treatment of common skin affections."

Dr. Alex. McPhedran of Toronto addressed the Sault Ste. Marie Medical Society on November 5th, on the subject, "Angina pectoris."

On Thursday, November 11th, at a meeting of the York County Medical Society held at Newmarket, Dr. D. E. Robertson of Toronto gave an address on "Orthopædic surgery." This was followed by a talk on "Psychiatry," by Dr. G. A. McLarty.

At a meeting of the Porcupine District Medical Society held at Timmins on November 12th, Dr. C. S. Wright of Toronto gave an illustrated talk on "Chronic arthritis."

N. B. GWYN

MANITOBA

Dr. D. A. Stewart, Superintendent of the Manitoba Sanatorium, gave an address before the Minnesota Sanatorium Association and the St. Paul Trudeau Association on December 8th. His subject was "The place of the sanatorium in the community." He also addressed the Hennepin County Medical Society on "Septic infections of the lungs and bronchi."

Dr. Arnaud Smith, formerly of Dunrea, has taken Dr. Blanchard's practice at Souris.

Dr. Chas. Ross and Dr. Donald C. McRae who have been on the staff of the Manitoba Sanatorium have left for Edinburgh to engage in post-graduate study.

The death of Mr. Peter McConnell which occurred on November 15, will be regretted by many of the medical men of this province who have admired the fine technique displayed in his chest and abdominal plates. While a patient at the sanatorium suffering from renal tuberculosis which eventually caused his death he mastered the details of x-ray technique and the clearness and completeness of detail of the plates he was able to produce were remarkable.

The internes of the Winnipeg General Hospital have formed an Osler Society for the study of medical history and their meetings have been full of interest. Several of the members of the attending staff and others, including Dr. Wm. Boyd, C. A. Barager, J. D. Adamson and D. A. Stewart have already addressed the society and other addresses will be given throughout the winter.

Dr. Marlatt has been appointed anæsthetist to the Children's Hospital, Winnipeg, succeeding Dr. Dan. McDougall.

ROSS. MITCHELL

SASKATCHEWAN

Dr. Angus A. Murray, orthopædic surgeon and Dr. Ross Mitchell assistant professor of obstetrics, both of the Faculty of Medicine, University of Manitoba, have just finished a series of addresses and clinics given to all the district medical societies in this province.

The first meeting was held at Yorkton but owing to the bad condition of the roads there were no doctors present from out of town. A meeting was held on the following day at Saskatoon. There was a good representation of doctors from both within and without the city. Those present dined together at the Hudson's Bay Restaurant and immediately following the dinner the society was addressed by both speakers. On November 17th a meeting was held in North Battleford in the Mental Hospital, where a dinner was served, Dr. J. W. MacNeill, Superintendent, presiding. In spite of a severe storm several doctors drove long distances to be present. On the following night a meeting was held in Prince Albert in the Council Chamber of the City Hall. The next meeting was held in Rosetown, and it is pleasing to note how greatly the attendance has increased in this society. Members had come in from very long distances. On Saturday night a meeting was held in the King's Hotel, Regina. Dinner was served at 6.30 p.m., there was a good attendance and the addresses of the evening were very much appreciated. Drs. Murray and Mitchell spent Sunday in Regina. They then proceeded to Weyburn where two meetings were held, one in the afternoon and a second one in the evening at the Mental Hospital. The following day addresses were delivered to the Moose Jaw District Society and dinner was served in the Moose Jaw Club. The last meeting was held at Swift Current.

Dr. Murray addressed the societies on "The management of infantile paralysis from the orthopædic standpoint" and on "Fractures." These were

illustrated with lantern slides. Dr. Murray also showed certain splints used by him in connection with fractures. Dr. Mitchell spoke on "Accidental hæmorrhage of pregnancy," with special reference to "Placenta previa." and on "The toxæmias of pregnancy." His addresses were illustrated with lantern slides. In addition to the addresses delivered, interesting cases were presented for diagnosis and a line of treatment suggested. The addresses and clinics were very much appreciated by those present. They were of a very practical nature which made them not only interesting but very valuable.

Dr. A. MacG. Young, General Secretary-Treasurer of the Association accompanied the speakers in their visits to the several societies.

Dr. H. R. Baines, who formerly practised at Webb is now associated with Dr. P. J. McCue of Gull Lake, Sask.

Dr. G. G. Binning who was at Briercrest, Sask., is now taking post-graduate work at Toronto.

Dr. H. H. Coffyn formerly of Salvador, is now at North Battleford, Sask.,

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Dr. J. A. Graham is now practising at Briercrest, having moved from Colgate, Sask.

Dr. R. A. Hughes, who formerly practised at Swift Current, Sask., and located at Moncton, N.B., after coming back from overseas, is now at St. John, N.B.

Dr. D. F. McRae, formerly of Carlisle, Sask., later of Winnipeg is now at Ninette, Man.

Dr. A. P. Murtagh, formerly of Battleford, Sask., is now located at Timmins, Ont.

Dr. L. A. C. Panton, of North Battleford, is at present in the Old Country taking post-graduate work. It is regrettable to learn that his health is somewhat impaired.

Dr. J. C. Richards, of Swift Current, has moved to Rush Lake, Sask.

Dr. Crawford Rose of Speers, has taken over the practice of Dr. H. C. Whitemarsh of Raddisson, Sask.

Dr. P. L. H. Warren formerly of Viscount is now practising at Edam, Sask.

Dr. D. C. MacDonald is taking care of the practice of Dr. T. F. Donnelly, M.P., of Kincaid, Sask., during the latter's absence attending the session of the House of Commons.

Dr. Peter Potoski, a graduate of Manitoba this year, has opened an office at Yorkton, Sask.

ALBERTA

During the present session one hundred and thirty-nine students have been enrolled in the various years in the Faculty of Medicine at Alberta University. Many nationalities are represented and 25 per cent of the students are from places outside of the province.

At the annual meeting of the Alberta Hospitals Association, held in Calgary, November 23rd and 24th, Dr. Harry B. Smith of the Royal Alexandra Hospital, Edmonton, was elected president. The Hospitals Association meeting was held in conjunction with the Alberta Association of Registered Nurses, and many subjects of interest were discussed at the several sessions. Among the papers presented were those of Dr. H. H. Baker, Superintendent of the Provincial Sanatorium at Keith, on "The relation of the general hospital to a tuberculosis sanatorium." Dr. Baker emphasized the necessity of providing accommodation for the tuberculous patient in all hospitals until such time as the patient could be admitted to a sanatorium. Room should be made in all hospitals for hopeless cases so that they might be taken care of near their friends. Dr. J. L. Allen dwelt on the advantages, as well as some of the disadvantages of gas-oxygen anæsthesia. He was of the opinion that gas-oxygen was a valuable anæsthetic with many advantages over other anæsthetics, since it was non-toxic and non-irritating. Moreover it could be used in operative procedures on patients suffering from tuberculosis, certain types of goitre, diabetes, or other toxic condition, with the knowledge that it was the safest anæsthetic to use and moreover there were no unpleasant after effects.

Coal mine operators in the Crows Nest Pass seem to be having difficulty in securing the services of contract physicians. Owing to the last coal strike, mine owners lost contracts for coal, which in some instances they have not been able to regain. As a result the miners have been idle much of the time, working only five to eight shifts a month. Hence there has not been adequate recompense for any physician taking up contract work at some of the mines.

Dr. Harold W. McGill, M.C., has been re-elected by acclamation to represent the Calgary District on the Council of the College of Physicians and Surgeons in Alberta. Dr. McGill is one of the local civic government candidates for a seat on the city council, where he will no doubt do splendid service, as he has in the past in the Calgary Medical Society, the Alberta Medical Association, on the Council of Physicians and Surgeons of Alberta and as one of the Alberta representatives on the Dominion Medical Council of Canada. He has the best wishes of his confréres.

Dr. R. R. Stoner, who has been practising at Irma, has returned to Pennsylvania, where he will reside. At the present time the town of Irma is without a physician.

Dr. A. R. Chisholm of Irricana has accepted a contract at Sangudo, where he will practise.

Dr. Frances Windsor Leacock of Calgary, is now in the east, engaged in post-graduate work. Her practice is being looked after by Dr. Claire R. Olhauser, a graduate of Manitoba University.

Dr. Frederick W. Stockton of Calgary, who has been at Rochester, Minnesota, during the past two months, is still seriously ill; the last reports would indicate that some improvement in his condition has been shown.

Dr. R. B. Deane gave a highly instructive talk to the members of the Calgary Medical Society, December 14th, on the case records of a number of ortho-

pædic disabilities, of much interest to the physician. This was illustrated by numerous lantern slides.

Dr. J. J. Knoll of Vermilion is at present in the east, taking post-graduate work. Dr. W. G. Saunders is acting *locum tenens* in his absence.

Dr. W. Merritt of Calgary attended the annual banquet of the Edmonton Academy of Medicine, on December 18th, as the representative of the Calgary Medical Society.

Dr. M. J. Brayton, who has been pursuing post-graduate work in surgery in the States, will return shortly.

Dr. W. S. Galbraith was again re-elected by acclamation to represent the Lethbridge District on the Council of the College of Physicians and Surgeons of Alberta.

Dr. C. E. Smyth of Medicine Hat is spending an extended holiday in California. We hope that he will return much improved in health.

Dr. G. W. Woodland, formerly of Medicine Hat, has taken up his residence in East Lynn, Massachusetts. Dr. Howard C. Dixon has taken over his practice, residence and office.

G. E. LEARMONTH

The meeting of the Academy of Medicine held in the Medical Building on November 15, 1926, was attended by upwards of seventy-five medical men. Under the auspices of the Canadian Medical Association post-graduate lectures were given by Dr. J. E. Lehman of Winnipeg on "Diseases of the colon" and by Dr. Hugh McKay of Winnipeg on "Skin diseases." Both lectures illustrated by lantern slides were of a very practical nature and in the course of discussion following, approbation of the action taken by the Canadian Medical Association to put on this post-graduate course was expressed and the duty of all medical men to become active members of the Association was emphasized.

The recent meeting of the American Public Health Association at Buffalo was attended by Dr. T. H. Whitelaw, M.O.H., as a delegate from the City of Edmonton.

A vigorous campaign of inoculation against diphtheria by toxoid, is being carried on in Edmonton by the Health Department and the Medical Departments of the School Boards. Through private physicians and these departments it is estimated that about seven thousand children and young adults have already been given the preventive treatment.

T. H. WHITELAW

BRITISH COLUMBIA

At the annual meeting of the No. 4 District (Okanagan) Medical Society, branch of the British Columbia Medical Association, held at Kamloops on September 30th, the following officers were elected for the ensuing year: President, Dr. S. G. Baldwin, of Vernon; Vice-President, Dr. G. L. Campbell, Kelowna; Secretary-Treasurer, Dr. J. E. Harvey, of Vernon. The retiring President, Dr. M. G. Archibald, and Secretary-Treasurer, Dr. A. L. Jones were heartily thanked for their services. There was an excellent attendance at the meeting.

The annual meeting of the Victoria Medical Society was held on October 16th. Dr. Thomas McPherson was elected President for 1926-27, succeeding the retiring president, Dr. J. W. Lennox. Dr. M. W. Thomas was chosen as Vice-President and Dr. R. L. Miller as Secretary-Treasurer.

On reviewing the work of the society during the past year Dr. Lennox referred to the splendid support the profession had accorded the Executive during the Canadian Medical Convention in June and the full attendance at the post-graduate lectures in October. The following members were elected to act as a library committee: Dr. Forrest Leeder, Dr. George Hall and Dr. H. M. Robertson.

The society passed a hearty vote of thanks to the retiring president, Dr. J. W. Lennox, and to Dr. R. B. Robertson, the retiring secretary-treasurer.

Dr. A. S. Underhill, who has been relieving at Waldo, B.C., for the last two months, is now working in the Pathological Department of the Vancouver General Hospital.

Dr. J. W. Laing of Vancouver, has been appointed assistant to Dr. A. M. Menzies at Britannia Beach.

Dr. R. J. Wride, who has been working in the pathological department of the Vancouver General Hospital for some months, has been appointed medical officer at Atlin, succeeding Dr. M. Fox.

At the November monthly meeting of the Fraser Valley Medical Society held in the Royal Columbia Hospital, New Westminster, Dr. H. C. Steeves, Superintendent of the Mental Institution gave an instructive address on "Mental diseases," particularly dealing with the legal responsibility a doctor assumes in committing a patient to the asylum.

Dr. Geo. E. Seldon of Vancouver will be the speaker at the December meeting of the Fraser Valley Medical Society.

A meeting of the local members of the executive committee of the British Columbia Medical Association was held on November 26th, when a number of important matters were dealt with. The applications of seventeen new members to the British Columbia Medical Association were handed to the Chairman of the Credentials Committee for consideration.

The new proposed provincial "turn-over" tax on gross incomes is being investigated by a special committee, as to its effect on the medical profession.

The year 1926 has been a busy one for the British Columbia Medical Association. The value of the business office is being more and more recognized, and rarely a day passes in which the Executive-Secretary is not visited by several medical men in quest of information or advice. Quite a number of vacancies have been filled during the year, whilst about forty *locum tenens* have been supplied. Enquiries have been made by industrial firms in regard to their medical requirements, and in certain cases adjustments, to the benefit of the medical officer have been obtained. There is much work to be accomplished during

the coming year, and the hearty co-operation of every member will be necessary.

The annual dinner of the Vancouver Medical Association was held on November 18th, and was allowed by all present to have been the most successful gathering for years past. This is the one social medical gathering of the year and is always looked forward to and back upon with great pleasure by the profession of the city.

At the general meeting of the Vancouver Medical Association held on November 2nd, Dr. C. W. Prowd gave an interesting analysis of results obtained in 600 cases of malignant disease treated with radium in St. Paul's Hospital. Dr. J. A. Sutherland, Proctologist of the Vancouver General Hospital gave an excellent address on "Pain and disability resulting from lesions about the anus."

Dr. Fred. N. Robertson has been elected to the vacancy in medicine on the staff of the Vancouver General Hospital, and Dr. William Morris to the vacancy in the tuberculosis division.

The Vancouver General Hospital is appealing to the rate-payers of Vancouver for $750,000 to replace two temporary wooden structures erected during the war, which are a dangerous fire hazard, but provide 200 beds. Proof as to the serious overcrowding of the hospital is shown by the fact that the average daily occupancy is 96 per cent of the room with a waiting list averaging thirty patients a day. The average daily occupancy over all hospitals in the United States within the last few years has been 76 per cent. In 1903, when the hospital was incorporated the number of patients treated was 857; in 1925 this number was increased to 14,460. The last permanent buildings were erected in 1913 and the work of the hospital has nearly trebled since that time.

The North Pacific Surgical Association is holding its annual meeting on December 10th and 11th, in Vancouver under the Presidency of Dr. H. R. Storrs.

The Vancouver Medical Association Summer School will be held in June 1927, and plans are already well in hand. It would be hard to find a better all-round place for a holiday than Vancouver and its neighbourhood. The men who attended the convention in Victoria last summer will support this assertion, and it is hoped that men from the Prairie Provinces will manage to take in the Vancouver meeting in the course of their summer holiday.

J. EWART CAMPBELL

UNITED STATES

In connection with the recent Johns Hopkins half-century celebration a dinner was given to Dr. John J. Abel, professor of pharmacology in the university, by his former pupils and some of the other contributors to a *Festschrift* recently published in his honour. On this occasion took place the formal presentation of a Morocco bound copy of the volume, which had been issued as Volume XXIX of the *Journal of Pharmacology and Experimental Therapeutics*, which Dr. Abel founded in 1909 and which he continues to edit. Among the contributors to the volume are some of the leading scientific men of Europe and the United States. Congratulatory telegrams and cables were received from Dr. Abel's many friends and colleagues in this country and in Europe.

Professor McKim Marriott, professor of pediatrics and dean at the Washington University School of Medicine, will deliver the annual medical lectures under the auspices of the San Diego County Medical Society during the month of January, 1927. A series of five lectures will deal with "Recent advances in biological chemistry."

The Rockefeller Institute for Medical Research announces the election of Dr. Francis Weld Peabody, professor of medicine in the Harvard Medical School and director of the Thorndike Memorial Laboratory of the Boston City Hospital, as a member of its board of scientific directors.

The Honorable Charles Evans Hughes, formerly secretary of state, has accepted the appointment of honorary president of the American Association for Medical Progress, succeeding the late Dr. Charles W. Eliot.

The Western Reserve University has received a grant of $975,000 from the General Education Board. The sum of $750,000 is to be used to build an institution of pathology for the school of medicine of Western Reserve and its affiliated hospitals. The board is giving the university the sum of $75,000 a year for the next three years, beginning on January 1, 1927, for the budget of the entire school of medicine. Work will start shortly on the erection of the new pathology institute. The plans call for a four-storey building.

Dr. Herman N. Bundesen, commissioner of health of Chicago, has been made professorial lecturer on public health administration in the department of hygiene and bacteriology at the University of Chicago.

On the occasion of the opening exercises of its new building, the New York Academy of Medicine gave a dinner on November 17 at the Waldorf-Astoria Hotel, in honour of twenty-two newly elected honorary fellows, each of whom has been selected on account of his contributions to medical science in the last twenty years. The new honorary fellows are: Robert Barany, Upsala; Charles James Martin, London; Sir Charles Sherrington, Oxford, Marin T. Tuffier, Paris; Josef Jadassohn, Breslau; Friedrich Neufeld, Berlin; Carlos Chagas, Rio de Janeiro; Frank Billings, Chicago; George E. de Schweinitz, Philadelphia; John M. T. Finney, Baltimore; Theobald Smith, Princeton; Edward William Archibald, Montreal, Sir George Newman, London; Henry Head, London; George F. I. Widal, Paris; Friedrich Müller, Munich; Vittorio Putti, Bologna; John Jacob Abel, Baltimore; Harvey W. Cushing, Boston; George Dock, Pasadena, Calif.; Chevalier Jackson, Philadelphia; William Sydney Thayer, Baltimore.

The Trudeau Medal for 1926 of the National Tuberculosis Association was awarded at the annual meeting in Washington to Dr. Theobald Smith of Princeton, as being the first to distinguish between the bovine and human type of tubercle bacilli.

In May next year a group of physicians with

members of their families from the United States and Canada, under the direction of the Inter-State Post-Graduate Medical Association of North America, will sail from New York to visit the following leading medical centres of the Old World: London, Edinburgh, Oslo, Stockholm, Upsala, Lund, Copenhagen, Hamburg, Leipzig, Munich, Strasbourg, Heidelberg, Frankfurt and Paris. This will be the third year that foreign assemblies have been conducted under the auspices of this organization. In including Norway, Sweden and Denmark in the itinerary, the association is offering the profession an exceptional opportunity to visit and study in some of the finest clinics in the world.

The group of physicians will be limited to a number that can be comfortably accommodated in the clinics which will cover the entire field of medical science. The price of the trip will be kept as low as possible and yet furnish first-class accommodations. It will be between $1,000.00 and $1,100.00. All physicians who are in good standing in their State or Provincial Society may register. Further information may be obtained from the Managing-Director, Dr. William B. Peck, Freeport, Illinois, or the Travel Department of the American Express Company, 65 Broadway, New York, N.Y., who have charge of the transportation.

Book Reviews

A Popular Encyclopædia of Health. By Dr. Lee K. Frankel and Dr. Donald B. Armstrong. Price $3.50. Albert and Chas. Boni, New York, 1926.

There are some who look suspiciously at "popular" writings on scientific subjects, and from the viewpoint of scientific investigation this attitude can be thoroughly appreciated. But there is undoubtedly a place for writings which shall guide intelligent and serious minded people in regard to their health. Indeed, there is the greater need nowadays, because so much instruction of all kinds is poured forth on the subject. To effectively impart knowledge in this manner, however, requires a high degree of judicious selection. This has been kept clearly in view in this encyclopædia, and it would be hard to suggest any additions, or—an equally high encomium—any subtractions.

In addition to this, it is written so clearly, and therefore so attractively, that one may well believe that those for whom it is intended will read it for its inherent interest rather than as a book of reference only. In a word it ought to accomplish that difficult object, the imparting of reliable information with the minimum of effort on the part of the reader. This is the aim of all "popular" forms of education, and it has been accomplished in this instance with a great measure of success.

H. E. MacDermot

Life Insurance Medicine. By Members of the Medical Department, New England Mutual Life Insurance Co. Vol. I. 219 pages, illustrated. Published by New England Mutual Life Insurance Co., Boston, Mass., 1926.

This volume contains eight studies, statistical and clinical, of more than ordinary interest, written by five medical officers of the New England Mutual Life Insurance Company, by which the book is published. The medical director, Dr. Edwin W. Dwight, and his assistants are deserving of general congratulations for their work as set forth in this volume, which must be regarded as a distinct achievement, interesting not only to members of the medical insurance staff, but also to the clinical teacher and the statistician.

Dr. Dwight presents the first study under the title "The Next Job in Preventive Medicine." He points out that the expectation of life has gained in the earlier years of life, due largely to "health" work directed toward the prevention, as well as to the better treatment, of infections in youth. On the other hand circulatory diseases are increasing. In 1922 more deaths were due to such diseases than to all preventible and infectious diseases combined. As these deaths occur among those who are bearing the "brunt of civilization" and doing "the work of the community" no figures can indicate the loss thus sustained.

"The next job" then is to prevent *circulatory diseases* and increase the expectation of life in those between thirty and sixty years of age. The author turns to study statistics seeking a cause for these impairments. After analyzing approximately 45,000 cards, support is found for the hypothesis "that the incidence of circulatory disease is in inverse relation to the amount of exercise the group takes in the open air and, other things being equal, it is in direct relation to the amount of nervous and mental strain."

Dr. Francis H. McCrudden discusses "Periodical health examinations," claiming that as preventive medicine and the education of the general public to this knowledge has been so effective in conserving young lives, so will this feature of preventive medicine eventually show good results in older lives.

The same author contributes an interesting article under the heading of "A proposed method of selecting risks among individuals with occasional slight glycosuria." The method of dividing the acceptable cases from those to be declined consists in giving the applicant for insurance 100 grms. of glucose dissolved in 250 c.c. of cold water and after two hours determining by Folin's method the sugar concentration in the blood. Applicants showing less than 0.12 per cent of blood sugar are accepted; those showing more than 0.12 per cent are not accepted.

In a paper on "A practical application of a knowledge of the creatinin content of the urine" the same writer sets forth many points of clinical interest, while discussing the value of this test as a measure of concentration "since the rate of creatinin excretion throughout the day is constant and bears a definite ratio to the weight of the individual." While already in practical use certain details need yet to be settled before the test can be generally applied.

Another contribution to insurance medicine as well as to medicine in the wider sense is that of Dr. Harold M. Frost in his article entitled "The cardio-respiratory test." This test is designed to sift those applicants with circulatory disease in whom a degree of impairment is suspected, but not great enough to warrant rejection by the ordinary methods of examination and thus to decide whose hearts warrant acceptance or approval.

Frost has devised a method by which the cardio-vascular function may be fairly accurately measured and recorded. Preferring a method that would permit constant observation of the blood pressure, and the cardiac rate and rhythm, the idea arose that by varying the intrathoracic pressure through inhaling as deeply as possible and holding the breath for about

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ten seconds, and exhaling as far as possible and holding the breath for the same time, one might produce a strain upon the cardio-vascular system and thus secure the conditions mentioned above. The article, interesting throughout, does not lend itself to analysis in such a review as this as diagrams are essential to clearness. The test has been applied in over 1,500 and the author predicts that "it will prove an invaluable aid in the evaluation and control of cardio-vascular disease."

The article on "Hypertension and longevity" by Dr. Frost, and that on "The reaction of the diastolic pressure to respiratory strain" by Dr. H. H. Amiral are studies at once stimulating and instructive. The discussion of "A neglected field of medical practice" is an invitation to teachers in medical schools, hospital physicians and medical practitioners generally "to pay more attention to normal individuals, to early and slight departures from the normal, and to early but definite symptoms and signs of disease." The writer, Dr. Blakely, urges the statistical method of studying records of hospitals, and those of individual physicians and surgeons and a combination of these records, so that facts may emerge where only impressions occupy the page. Insurance companies and those interested in curative medicine, in preventive medicine and in public health may thus derive much help in solving each other's problems and the "no man's land" of medical practice may be occupied to the advantage of all. W. F. HAMILTON

A Manual of Proctology. T. Chittenden Hill, Ph.B., M.D., F.A.C.S. Instructor in Proctology, Harvard Graduate School of Medicine, etc. Second edition. 268 pages. 101 engravings. Price $3.50. Lea & Febiger, Washington Square, Philadelphia, 1926.

This manual apparently sets out to provide a concise survey of the proctologist's special branch of surgery. The book is clearly written and deals with each branch of the subject in a well-balanced and eminently practical manner. Perhaps it is this desire to emphasize the practical side of his subject that accounts for the omission by the author of such uncommon conditions as imperforate anus, melanoma and post-anal gut tumours. We are, however, surprised to find no reference to condylomata of the anus.

The chapter on recto-sigmoido-colitis seems to us the weakest in the book, and that chiefly on account of the small space devoted to differential diagnosis. The latter part of the book dealing with such definite subjects as hæmorrhoids, anal fissure, fistula, etc., is admirable and useful, and this standard is well maintained by the last chapter on the radical treatment of carcinoma of the rectum, contributed by Dr. R. C. Coffey of Portland, Oregon. On the whole, then, the book forms a useful résumé of proctology, and it contains nothing superfluous nor anything of which any surgeon undertaking the treatment of diseases of the rectum can afford to be ignorant.

The compactness of the volume is an attraction, the illustrations are good, and there is an excellent index. W. E. M. MITCHELL

Roentgen Interpretation. A manual for students and practitioners. George W. Holmes, M.D., and Howard E. Ruggles, M.D. 326 pages with 226 illustrations. Third edition revised. Lea & Febiger, Philadelphia & New York, 1926.

The third edition of this work is a very decided improvement upon its predecessors. The text was always good but the illustrations in the previous editions left much to be desired. This has been corrected and the volume now presented is printed on the best of paper throughout, making it possible to properly reproduce the x-ray negatives, a difficult task at any time, but quite impossible on poor paper. For this improvement the publishers deserve great credit.

The text covers the general field of x-ray interpretation systematically, giving the essentials concisely and well. The authors have the advantage of years of experience and an enormous amount of material upon which to draw for such purpose. Holmes' reputation as a teacher is too well known amongst Roentgenologists to require any further recommendation of the book. For those to whom he is not known, it may be highly recommended as being a safe, conservative exposition of a rather difficult subject in a form easily "get-at-able" in these days of many books.

There are 226 illustrations and each subject described in the text is illustrated when that is possible by characteristic plates for reference and guidance in applying principles of interpretation.

It is emphasized that there is great danger in interpreting x-ray plates merely by comparing them with similar plates in a so-called atlas. While this may be helpful in certain characteristic lesions, yet it fails completely so soon as atypical lesions are encountered. Much the sounder method is that which is outlined in this book, based upon a firm foundation of pathology and the application of this knowledge to radiology. G. E. RICHARDS

La Tuberculose Pulmonaire Latente. J. Rieux, Medicin Inspecteur de l'Armee, ancien professor au Val-de-Grace. 1 Vol. in-8 de 252 pages avec xii planches hors texte, reproductions de radiographies thoraciques. 28 fr. plus hausse 40 per cent. Gaston Doin et Cie. 8, Place de l'Odeon, Paris, 1926.

This difficult subject has been carefully and thoroughly dealt with by Prof. Rieux. He shows clearly how hard it is to diagnose the latent forms of tuberculosis, and how much more difficult it is to give a prognosis.

General Medicine. Practical Medicine Series 1926. 737 pages. Price $3.00. Year Book Publishers, Chicago.

This is the volume covering work in general medicine for the year 1926, and edited by Drs. Weave, Laurason Brown, R. B. Preble and R. C. Brown. This book reflects very typically the difficulty there is in collecting actually new material for separate annual publications. On the other hand there is evidence of very efficient reviewing of the literature in general medicine. The illustrations and printing are of a high order.

Les Syndromes d'Aortite Posterieure. Ch. Laubry, Medécin de l'hôpital Broussais, A. Mougeot et J. Walser, anciens internes des hôpitaux de Paris. I volume in-8 raison de 240 pages, avec 19 figures dans le texte et 7 planches, dont 3 en couleurs, hors texte. 35 fr. Gaston Doin, 8 Place de l'Odeon, Paris, 1926.

A comprehensive and well written discussion on diseases and symptoms associated with the aorta in its course on the posterior thoracic and abdominal walls.

Reports of the St. Andrews Institute for Clinical Research, St. Andrews, Fife. Vol. iii, 1926. Edited by Prof. David Waterson, M.D., F.R.C.S.E. 227 pages, illustrated. Humphrey Milford, Oxford University Press.

There is much interesting material in this third volume of the reports from the St. Andrews' Institute, brought out under the able editorship of Sir David

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Waterson. It opens with a sketch of the life of the founder of the institute, a man whose life cannot be too well known to all medical practitioners. "Like Sydenham", we are told "he was 'a man of many doubts'," wherein lay to a great extent the secret of his greatness. His doubts, however, never overwhelmed his spirit, or he would not, at the age of fifty-five, have given up a large general practice in the country, and, in the face of no small degree of criticism, have established himself in Harley Street as a consultant on heart disease. His first year's earnings in London did not pay the rent of his consulting room, and he also had other troubles, but after he had published his "Diseases of the Heart" the tide turned and swelled high in his favour. He retired at sixty-five and devoted himself to the founding of the centre at St. Andrews which now produces the work contained in this volume.

Subjects of the most varied nature are dealt with: the relations of the capillary system to clinical symptoms; viscero-sensory reflexes; studies on epidemic parotitis; studies on exhaustion; of the clinical manifestations of blood supply to the voluntary muscles; and notes on the radiography of the duodenum. Throughout all these, Sir James Mackenzie's idea is well maintained, of seeking the beginnings of disease.

H. E. MACDERMOT

The Surgical Clinics of North America. Vol. vi, No. 5. Mayo Clinic number. W. B. Saunders Co., Philadelphia. McAinsh Co., Toronto, October, 1926.

This is the Mayo Clinic number of this series; it contains the usual extensive and well chosen list of papers.

British Medical Association Annual Handbook 1926-7. 251 pages. Price 3/6 net. British Medical Association, Tavistock Square, London, W.C.1.

A work of reference for secretaries of medical associations, but containing much that is of interest in regard to the history of the British Medical Association.

Light Treatment in Surgery. By Dr. Oscar Bernhard (St. Moritz), translated by R. King Brown, B.A., M.D., D.P.H. (Lond.). Edward Arnold & Company, London.

This work of 308 pages, with a foreword by Leonard Hill, M.B., F.R.S., is very readable and is at the same time, a scientific treatment of the subject by one who has spent the past thirty-three years in developing sun treatment in the high Alps. The historical sketch is most interesting and would indicate a wide grasp of the literature on the subject. The work is treated under the headings of Light Biology, Light Pathology, Light Therapy and Climatological Considerations.

The bulk of the second part of the book is devoted to a discussion of the sun treatment of surgical tuberculosis based on the author's work of many years in his sanitarium at St. Moritz. The rôle of pigmentation is discussed and the various theories mentioned, notably that of Jesionek, that pigment when formed by the action of light is passed on in solution into the blood and lymph streams in a histochemical and unrecognizable form. These resultant products are looked upon by Jesionek as the agency whereby light affects tuberculosis; patients do best who pigment best, others suffering from tuberculosis may be sunned to any extent but they do not pigment and in these cases the prognosis is always bad. The dark skin heats more readily than the fair, therefore pigmentation facilitates heat therapy.

The effect of light may be increased by sensitizers or light catalyzers: firstly, by those of an endogenous order, *e.g.*, hæmatoporphyrin, and secondly, those of an exogenous source, *e.g.*, eosin, buckwheat, etc. Artificial sources of light have their place but after all they are only substitutes, especially when compared to the natural sunlight on high glacial districts.

From the standpoint of therapy the author considers that all infected or discharging wounds, ulcers, or sinuses, are best treated by light and left without any gauze or cotton dressings as these serve only to retain the infected material in the wound. In addition to light and air the affected part is dusted freely with iodoform powder. Much importance is placed on the "Hardening effect" which is coincident with cures in the Alps due to exercise in the open air in that rigorous climate; and it is claimed that the percentage of recurrences under these conditions is far less than is the case in lower altitudes.

NORMAN BROWN

Factors Affecting the Distribution of Electrolytes, Water and Gases in the Animal Body. Donald D. Van Slyke, Ph.D., Sc.D. 62 pages with charts. Price $2.75. J. B. Lippincott Co., 201 Unity Bldg., Montreal, 1926.

This little volume is one of a series of monographs on experimental biology and consists of three lectures under the Kellogg Foundation delivered at Rutgers University. These largely embody the results of Dr. Van Slyke and his co-workers, affording experimental evidence in support of the theories of L. J. Henderson which have given a reasonably simple explanation of the distribution of water, electrolytes, and gases in blood and tissues.

Throughout the volume stress is laid upon the assistance afforded by Donnan's law, as applied to the distribution between cells and plasma with the relatively large amount of non-dialysable hæmoglobin in the cells, and between plasma and lymph and œdema fluid, with the greater protein content of the plasma, and it is shown how this conception of Donnan taken into conjunction with the markedly acidic properties of hæmoglobin will explain almost all the known facts related to the subject-matter of the title. While the treatment is as simply mathematical as the nature of the subject permits, yet it is too greatly so to render the book readable to the average clinician. It should, however, certainly be read by all engaged in research in any way related to the subjects discussed.

A. T. CAMERON

The Theory and Practice of Massage. Beatrice M. Goodall-Copestake. Fourth edition. 267 pages, 72 illustrations, Price 12/6 net. H. K. Lewis & Co., Ltd., London, W.C.1, 1926.

In view of the rapid progress made in recent years in various forms of physiotherapy, it is unfortunate that more reliable text-books on the subject are not available. A notable exception, however, may be mentioned in the case of massage, which is perhaps the oldest form of physical therapy. Numerous volumes have been written on the subject, and the one under review is of special merit and is well up in modern requirements. It was written primarily for the use of the masseuse in training and in practice, but will be found equally interesting and instructive to the physician.

Like most books on massage, it is based on the Ling or Swedish system. There are twenty-four chapters well arranged, dealing with such subjects as the history of massage, training schools, personality, massage technique and manipulation, physiological effects of massage and muscle re-education.

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Detailed description is given of the application of massage in various medical and surgical conditions. The author has avoided making extravagant claims as to the results, and in the preface points out the necessity of co-operation with the medical profession. Mention is made of the Chartered Society of Trained Masseusses and its aims, *viz.*, to improve the status and training of the masseuse, to conduct examination and to grant certificates.

The following rules are quoted as being of special interest to the medical profession:

1. Not to undertake cases of massage except under the direction of a registered medical practitioner.
2. Not to advertise, except in medical or nursing journals.
3. Not to sell goods to patients in a professional capacity or to accept secret commission on the sale of goods.

The book is well illustrated and contains specimens from examination papers, glossary, index and bibliography. Unfortunately, the scope of the book does not provide for a more extensive account of the remedial exercises, which form so important a part of massage treatment. F. W. HARVEY

The Quartz Mercury Vapour Lamp. J. Bell Ferguson, M.D., D.P.H. 106 pages, 38 illustrations. Price 6/- net. H. K. Lewis & Co. Ltd., London, W.C.1, 1926.

As the preface clearly states this little book does not pretend to be anything more than a simple exposition of the uses to which the quartz mercury vapour lamp may be put in the general practice of medicine, and it seems to be addressed particularly to the general practitioner.

On the whole it can safely be recommended, but there is a tendency to over-enthusiasm on the part of the author, and one particularly misses the absence of control cases. Conclusions are drawn in some cases on insufficient evidence; for example, in the chapter headed "Vita Glass" on page 56, the results of the uses of this glass in a class room were tabulated, and it is stated that the average hæmoglobin increase amongst the boys was 16.14 per cent. Whereas in a class room lighted through ordinary glass the average gain in hæmoglobin was 7.53 per cent, and also that the average height and average weight increased more rapidly in the group where vita glass was installed in the class room. It should be remembered that the average height and weight of the boys in these two class rooms at the beginning of the experiments was not the same and that at different ages the rate of gain in height and weight varies as does also the hæmoglobin content of the blood.

Apart then, from the undue enthusiasm which this book may easily arouse in the minds of the inexperienced it has a real value, for it describes in detail the methods and dosage required in the treatment of different diseases. H. P. WRIGHT

The Diseases of Infancy and Childhood: for the use of students and practitioners of medicine. L. Emmett Holt, M.D., Sc.D., LL.D., and John Howland, A.M., M.D. D. Appleton and Company, New York and London, 1926.

This, the ninth edition of this well known textbook, is prefaced by a fine appreciation of the late authors by Dr. E. A. Park, of Yale. The form, proportions and general character of the book are but little altered. However, as compared with the previous edition, much new material has been included, and, with increased knowledge, some of the ideas previously expressed have been either omitted or changed. Extensive changes have been made in the chapters on infant feeding, diseases of the intestines, lungs, heart, kidneys, nervous system, blood, ductless glands, scarlet fever and diabetes mellitus. New sections on exanthem subitum, glandular fever and erythredema have been included.

As a text-book for students in pædiatrics the book remains probably the best in the English language; the arrangement of the material and the indexing are both excellent. The first section concerning the hygiene and care of infants, growth and development of the body, and the peculiarities of disease in children and its therapeusis are especially noteworthy for their conciseness and explicitness.

The recent sudden and lamented death of the junior author of the book, Dr. John Howland, following so closely on the death of Dr. Holt, is a severe loss to American pædiatrics. R. R. STRUTHERS

Electrothermic Methods (Desiccation and Coagulation) in the Treatment of Neoplastic Diseases. J. Douglas Morgan, B.A., M.D., formerly Radiologist, Ross Pavilion, Royal Victoria Hospital, Montreal, etc. Price $2.75. 172 pages illustrated with 36 line and half-tone engravings. F. A. Davis & Company, Publishers, Philadelphia, 1926.

This small handbook has been written at a very opportune time, when these methods of treatment are rapidly coming to the fore, and are giving such gratifying results.

The general principles of electricity are reviewed, and presented in a most readable manner, and the definitions are very clear.

The uses of the various methods are given in a modest manner and no extravagant end results claimed.

It has an excellent bibliography and well arranged index. I feel that anyone interested in these forms of treatment will enjoy a study of this work.

W. L. RITCHIE

Health Compendium and Health Publicity. T. Crew, F.F.I., F.I.H., and Foreword by Prof. A. Bostock Hill, M.D., M.Sc., D.P.H. 260 pages, illustrated. Price 8/-. The Reader Printing Co., Leicester, 1926.

This little book will be very useful to those persons and societies engaged in health activities, more especially to those interested in health propaganda and publicity. After a timely foreword by Professor Bostock Hill in which he stresses the need for public health education, a brief description is given of the societies and organizations of Great Britain that directly or indirectly are concerned with health work. Some of the American and Canadian ones are also mentioned. There are in all some 200 such societies, the oldest being the Royal College of Physicians founded in 1518; the most recent the Health and Cleanliness Council founded in 1926.

It is a little disappointing to find included in this list announcements setting forth the aims of the Anti-Vivisection Society and the Anti-Vaccination League. A reference to these would seem out of place in a health compendium.

There is, conveniently arranged, much information regarding the manner in which health and baby week campaigns may be conducted. Over fifty pages are devoted to illustrations of propaganda posters, healthgram, cards, leaflets and health mottoes. A list of health films and of the most important health journals is added. At the top of each page is a pointed health sentence such as: "Get the conscious habit of deep breathing," "Good health is a constant feeling of well being," "Most infections are hand to mouth infections," "A bath should be a habit not an event," "An un-

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guarded sneeze may spread disease," "Keeping health is better than seeking health." Mr. Crew's book has a place in public health literature.

R. ST. J. MACDONALD

The Mind in Disease. M. P. Leahy, B.A., M.D. 188 pages. Price 6s. net. William Heinemann Ltd., W.C.2, 1926.

The author is an Irishman, with the sense of humour, resourcefulness and dramatic power peculiar to many of his race. This interesting book is evidently a vivid expression of his personality. His claim for the power of suggestion cannot be termed modest, even though he does not hold that mind is omnipotent over mental and physical ills. But he is surprisingly modest with regard to his own powers. Freudian "transference" is not mentioned.

He appeals to his patients' will power and imagination, and in most instances puts them into a hypnoidal state. He then teaches them to produce the same condition themselves, and then "the doctor drops out of the picture." Unfortunately he does not state in what proportion of cases his treatment failed. Among all the cases described only one failure is recorded.

In his foreword the author draws attention to a fact which might profitably be borne in mind by all concerned with the treatment of patients suffering from chronic diseases, "The patient becomes obsessed with the idea that his condition is incurable, and the hopelessness of his mental outlook retards his physical recovery."

The book is interesting throughout and may be recommended to any readers interested in suggestion.

A. G. MORPHY

Modern Clinical Syphilology. John H. Stokes, M.D., Professor of Dermatology and Syphilology in the School of Medicine, University of Pennsylvania. 1144 pages, 865 illustrations. Cloth. Price $13.00. W. B. Saunders Co., London and Philadelphia. McAinsh & Co., Toronto, 1926.

This is a very comprehensive text-book of syphilis. It deals with all organic manifestations of this disease. Great detail is given in a categorical fashion of clinical and diagnostic procedures in all phases of its management.

Special attention has been exercised in dealing with the diagnosis of the earlier and later skin manifestations. The differential diagnosis of such lesions and other dermatoses is presented in a very lucid manner, and the illustrations are numerous and instructive. Modern treatment of syphilis is thoroughly outlined.

The book is written in an easy style and may well be recommended to students and syphilologists alike.

J. F. BURGESS

Defective Memory and Absentmindedness and their Treatment. Arnold Lorand, M.D., Carlsbad, Czecho-Slovakia. Price $3.50. 340 pages. F. A. Davis Co., Philadelphia, 1926.

The title of this book might easily have been almost anything else, such as a treatise on intestinal disorders, the influence of the thyroid gland on the onset of old age and the formation of red blood corpuscles, the treatment of defective memory due to high blood pressure by nasal hæmorrhage, or vibratory massage applied to the nose; it may be regarded as a compend of useful hints such as how to avoid forgetting an umbrella by placing a hat over it, how married men should avoid the possibility of divorce by not talking in their sleep; or even as an original system of pathology and therapeutics illustrating how the processes of memory depend upon the thickness of the fibrillæ of the cells in the third and fourth layers of the cerebral cortex. Deficient action of the thyroid is made a scapegoat to bear the burden of many conditions. Graves disease is stated to be closely allied to diabetes, and uric acid is said to be considered by Charcot and Gowers as the etiological factor in epilepsy. And so on. The book contains scores of statements equally untenable and unprovable, and one wonders whether Dr. Lorand, who claims to have acquired twenty-three languages, and must have done very extensive reading in order to cite 150 authors of different nationalities, really believes all he says. He is either a conscious humorist and is trying our credulity, or he is an unconscious humorist who tells a side-splitting story with a grave face, and no appreciation of the humour of the situation. In either case it must be admitted that he tells a story well, even if the story is unbelievable.

Here and there memory and absentmindedness are mentioned, but the bulk of the book is about other issues. The book may be recommended to anyone who would like to be amused for an hour or two.

A. G. MORPHY

Hydrogen Ion Concentration. Vol. I. **The Theoretical Principles.** Leonor Michaelis, M.D., Sometime Professor of Physical Chemistry in the University of Berlin. Authorized translation into English by William A. Perlzweig, M.A., Ph.D. 299 pages, 32 illustrations. Price $5.00. Williams & Wilkins Co., Baltimore, 1926.

The volume to be reviewed has been written by an outstanding investigator in the wide field of hydrogen ion concentration phenomena. It is an American translation of the greatly enlarged second edition in German of the work which now fills two volumes. The first volume to appear in English deals with the theoretical principles, with occasional references to their applications in the biological sciences. It is divided into two equal parts.

The first treats of the chemical equilibrium of ions and contains chapters on the laws of electrolytic dissociation, the theoretical principles underlying the quantitative measurement of acidity and alkalinity, and a consideration of the dissociation phenomena of strong electrolytes. The treatment of the subject is strictly physio-chemical, very frequently on a mathematical basis, accompanied by very able word expositions. In this section there is to be found a clear enunciation of the applications of the Mass Law to ionization, of true and "apparent dissociation" constants, of the modern definition of acids, alkalies and ampholytes, of the meaning of pH, of the mechanism of buffer action, and the measurement of the isoelectric point. As a practical instance the anomalous behaviour of uric acid is developed amongst weak acids and the strongly basic nature of ammonia is emphasized.

The second part treats of electric potential differences brought about by ions. There are chapters dealing with electrode phase boundary, membrane and adsorption potentials. In these chapters one finds a theoretical background for chemical chains with a discussion of different types of electrodes. A brief section is devoted to oxidation-reduction potentials. A concise explanation of Donnan's equilibrium and its limitations is given. The phenomena of electrophoresis and electroendosmosis are given considerable space.

The book is as clearly printed as it is written and the translation is well done. It will prove an invaluable aid to all those doing research in this popular field, and to any who wish to grasp the subject thoroughly.

E. GORDON YOUNG